DRAFT REPORT ON

PETROLEUM CONTAMINATION INVESTIGATION

EXIT 7 I-91 TRAVEL CENTER
SPRINGFIELD
SPRINGFIELD, VERMONT

Prepared for
Johnson & Dix Fuel Corp.

Submitted by
Dufresne-Henry, Inc.

February • 1993

TABLE OF CONTENTS

PETROLEUM CONTAMINATION INVESTIGATION

EXIT 7 I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

Introduction

The Exit 7 I-91 Travel Center is located at the intersections of U.S. Route 5 and Vermont Route 11 and on the west side of Interstate 91 in Springfield, Vermont. A location map is included as Appendix A.

In late September 1992, pressure testing was performed on the fuel systems at the station. The supply line between the pump dispenser and underground storage tank for the super unleaded gasoline system failed the test. The underground tanks are located approximately 100 feet east of the dispenser islands. Johnson & Dix Fuel Corporation, who leases the station, contracted with Gurney Brothers Construction who exposed the piping and found the leak at a pipe coupling about 15 feet east of the dispenser. Repairs to the piping were completed by Beardsley, Inc. All of the product piping at the station was subsequently replaced with double-walled piping with line leak detectors.

This report discusses the initial response and subsequent activities performed by Dufresne-Henry to evaluate the severity and extent of the gasoline contamination at the site.

A soil gas survey and groundwater samples from a series of monitoring wells installed at the site have shown that the contamination has affected approximately 1 acre of land to the southeast of the leak location. This area extends off of the station property to the south, beneath land owned by the State of Vermont. There is free product present in the two wells closest to the product piping. To date, the groundwater

gradient across the affected area has been observed to be flat, which will tend to minimize the lateral movement of the plume. The only potential subsurface receptor in the immediate vicinity of the contaminant plume is the well which serves the station, which is reportedly a drilled rock well. An initial test of that supply in November 1992 did not detect contamination from gasoline.

Continued monitoring, additional investigations and remedial actions will be required at this site.

Initial Response

On September 25, 1992, Dufresne-Henry, Inc. responded to a request from Johnson & Dix to perform a preliminary assessment of the extent and severity of leaked product at the I-91 Travel Center. At the time of our arrival on site, the station had been closed by the Springfield Fire Department due to the potential for fire or explosion during excavation. Two sections of the piping trench had been opened. One section ran about 20 feet from the dispensers toward the underground storage tank. The other section ran from the storage tank for a distance of 20 feet toward the dispenser. Several samples of the soil from the trench near the dispenser island were collected and scanned with an HNU PI-101 photoionizer (10.2 eV lamp). Readings ranged from 200 to 300 ppm and higher.

Further excavation was attempted to establish the extent of contamination. However, as the pavement was removed, the off gas from the soils beneath the pavement was extremely strong, and it was decided to cease excavation and consult with the State of Vermont Agency of Natural Resources (ANR), Hazardous Materials Management Division (HMMD), Sites Management Section (SMS).

On Tuesday September 29, 1992 the initial observations were discussed with Mr. Ted Uncles at the HMMD Underground Storage Tank Division. Mr. Uncles requested that a soil gas survey be completed at the site.

Soil Gas Survey

On October 1, 1992, D-H personnel completed a soil gas survey at the site. Nine soil gas survey points were installed and screened for VOC's with an HNU. Readings were obtained at 18 inches and 36 inches below ground surface (BGS) at each sampling point. Generally, readings of approximately 100 ppm were observed closest to the former location of the faulty coupling and diminished as the points move outward. An October 9, 1992 letter from D-H to Ted Uncles is included as Appendix B. The results of the soil gas survey, including two site plans showing the vapor isoconcentrations in the soil strata at depths of 18 inches and 36 inches, are contained in that correspondence.

In general, the results of the soil gas survey did not indicate that the contamination in the vadose zone was as widespread or as strong as suspected based on the observations immediately following the discovery of the leak.

Inventory Reconciliation

Johnson & Dix performed an inventory reconciliation of the premium unleaded fuel system for the period October 1991 through September 1992. As shown in the following table, approximately 2600 gallons of premium unleaded fuel was unaccounted for over this period.

TRAVEL CENTER

MONTH	GALLON SALES (METER)	VARIANCE PER INV. REPT.	VARIANCE AS % OF SALES
OCT. '91	6283	−300	.0477
NOV. '91	5836	−324	.0555
DEC. '91	6471	+805*	N/A
JAN. '92	6399	−236	.0369
FEB. '92	6502	−171	.0263
MAR. '92	5411	−333	.0615
APR. '92	5294	−141	.0266
MAY '92	6995	−143	.0204
JUNE '92	6296	−339	.0538
JULY '92	7459	−204	.0273
AUG. '92	7705	−384	.0498
SEPT. '92	6290	−32	.0051
	70,470	2607	.0374
		(EXCLUDING DEC. '91)	

* 89 OCTANE (SPECIAL UNLEADED) WAS +1100 GAL. THIS MONTH, AND DEALER THINKS SOME 89 WAS DELIVERED INTO THE 93 (SUPER) TANK.

Work and Health and Safety Plans

As a result of the initial findings, the SMS requested additional investigations at the Travel Center in their letter of October 15, 1992. A copy of that letter is included in Appendix C. Dufresne-Henry prepared a Work Plan, and Health and Safety Plan for the proposed activities at the site. Copies of these documents may also be found in Appendix C, as well as the letter from SMS approving the work plan. The remainder of this report describes activities and subsequent findings based on the approved work plan.

Monitoring Well Installation

From November 16 to November 23, 1992, Dufresne-Henry personnel observed the installation of eight shallow groundwater monitoring wells on the site and portions of the adjacent property. The wells were installed by Soils Engineering of Charlestown, New Hampshire. The Dufresne-Henry field report and a detailed boring log for each well may be found in Appendix D. The driller's boring logs are included in Appendix E. The well locations and site topography are shown on the Site Plan in Appendix F.

Split spoon soil samples were obtained at five-foot intervals in some borings and continuously in others. The frequency was determined in the field based on known or expected conditions. The split spoon samples were scanned for VOC vapors with an HNU PI-101 photoionization detector with the 10.2 eV lamp. HNU readings are included in the Dufresne-Henry boring logs. The samples were placed in clean glass jars and were retained by Dufresne-Henry. Any excess contaminated soil from the monitoring well installation was placed in the existing contaminated soil stockpile on site.

Ambient air quality was also monitored periodically during the drilling and well installation with the HNU.

Monitoring wells MW-1 through MW-6 were installed on the level plateau around the Travel Center. The presence of tree roots and organic soil in borings MW-1 through MW-4 indicates that the easterly portions of the site were filled prior to the construction of the station. Fill depths varied from 14 feet at MW-1 to 10 feet at MW-3. The fill material generally consists of silty sand and gravelly sand. Below the fill to a depth varying from 28 to 30 feet the soils were generally silt, sand and gravel. The soils at 30 feet to 32 feet were identified as a denser silt.

Gasoline odors were observed in borings 1, 2, 4, and 6. The strongest odors were encountered in MW-2 and MW-4, which are closest to the tanks and piping trench. MW-4 is very close to the leak location, and odors in that boring were observed from the surface to nearly the depth of the boring. The maximum HNU reading observed was 180 ppm. A similar HNU reading was observed in MW-2, which is located just south of the tanks. However, the odors were not encountered until original ground was reached at a depth of 11 feet. A similar situation was encountered in MW-1, where gasoline odors were not observed until a depth of 15 feet. An uncharacteristic "antiseptic" odor was observed at depths from 14.5 feet to 21 feet in MW-6, just west of the store. A maximum HNU reading of 20 ppm was observed in this boring. No evidence of contamination was encountered in MW-5, which is located about 150 feet northwest of the leak location. Evidence of contamination was minimal in MW-3, which is northeast of the leak location.

All of the wells on the plateau extend to a depth of 30 to 32 feet. At approximately that depth, the soil was observed to change from a sand and gravel to silt. In those borings exhibiting gasoline vapors, the strength of those vapors decreased markedly when this depth was reached, indicating that the silts are serving as a barrier

limiting the downward migration of dissolved product. Borings were terminated at this depth to avoid puncturing the apparent impeding layer and allowing migration of contaminants to greater depths.

Monitoring wells 7 and 8 were installed south of the station on land owned by the State of Vermont. MW-7 is about 175 feet south of the UST location, in the low brushy area behind the station. The ground level in this area is about 16 feet below the plateau on which the station sits. MW-8 is located about 400 feet south of the station.

The location of MW-7 is assumed to be in an area of natural soils, as no fill materials were observed, and the soil materials were silt, sand and gravelly sand. Although the water table was encountered only 2 feet below the surface, faint to moderate petroleum odors were not observed until depths of about 11 feet to 14 feet. The silty confining layer described above was encountered at 14.5 feet and the boring terminated at 16 feet.

MW-8 exhibits a somewhat different geologic profile than the borings taken in the more immediate vicinity of the Travel Center. Silt and sand were found to a depth of about 9 feet. From that depth to about 17 feet, wood and organic matter were found, possibly indicative of a burn pile associated with the interstate construction. From 17 feet to 24 feet, the material was silty organic matter which exhibited an odor associated with anaerobic decay. Below 30 feet, flowing sands were encountered which prevented additional sampling. No evidence of the gasoline plume was observed during the installation of this well.

The wells installed in each boring consisted of .020-inch factory slotted screen from the bottom of the boring to above the water table observed at the time of installation. Silica sand was used to backfill the annular space around the well to above the screen.

A 1-foot bentonite pellet seal was placed above the silica sand. The remaining annular space to the surface was backfilled with native material. Each of the wells near the station are protected by steel road boxes grouted into place. MW-7 and MW-8 are protected by steel stick-up casings.

Site History

The boring/monitoring well installation provided some insight into the development of the site. The history of site usage and ownership was researched to document activities which may be responsible for the conditions observed today.

The I-91 Travel Center is currently a self-service filling station and convenience store. The site has underground storage tanks and dispensing equipment for regular, mid, and premium grades of unleaded gasoline, as well as diesel and kerosene. According to employees of Johnson & Dix Fuel Corporation, the convenience store has operated at this site since they began leasing the property in November 1981. The tanks which are now in place were reportedly installed at that time. Prior to November 1981, the station reportedly operated as a filling station with a 2-bay maintenance facility. Conversations with the personnel at the Town of Springfield Tax Assessor's Office indicated that the structures on the site were built in 1970.

The property is owned by Mr. Stanley Patch. Johnson & Dix Fuel Corporation leases the property from Mr. Patch who has owned the property since January 27, 1981. From that date to November 4, 1981, Mr. Patch owned the land indirectly through the Stanley Corporation. On November 4, 1981, the Stanley Corporation transferred the property to Mr. and Mrs. Stanley Patch.

The Stanley Corporation acquired the property from the Exxon Corporation on January 27, 1981. It is assumed that Exxon operated the property as a filling station. Exxon acquired the property through a merger with Humble Oil & Refining Company on January 1, 1973.

The Humble Oil Corporation purchased the property from Shattuck's Garage Inc. on April 17, 1970. Shattuck's Garage purchased the property from Mr. Edward I. Howe in December 1967. Although the deed refers to "Shattuck's Garage," a Dufresne-Henry survey of the property dated November 1969 did not indicate any structures on the property. Also, long-time area residents employed at Dufresne-Henry recalled that the Shattuck operation was at a location on Clinton Street about two miles west of the site.

Mr. Howe purchased the property from Albert and Helene Mintel in January 1929. The deed makes no reference to use of the property, but several individuals recall the property as the Howe Farm. The location of the farm buildings was apparently near the present location of the Howard Johnsons complex, which is to the north of the Travel Center on the opposite side of Route 11. It is also noteworthy that the former Springfield Railroad runs along the northerly edge of the property, and that the State has a maintenance and storage yard near the railroad line. This facility is located northeasterly of the site on the same side of Vermont Route 11.

The site was likely substantially altered during the construction of Interstate 91. Mr. Neil Martin, a current Johnson & Dix employee and former Springfield police officer, recalled that the site and surrounding area served as a staging area during road construction. Activities likely included storage of fuel and heavy equipment, and burning of wood waste. Such activities may be responsible for the conditions observed in MW-8.

Site Geology

The site is located near the confluence of the Connecticut and Black Rivers. These river valleys were occupied by glacial Lake Hitchcock during a temporary recession of the continental ice sheet during the Pleistocene Epoch. Much of the surrounding area is overlain by glaciolacustrine sediments that have been locally reworked by natural and human activities. As noted above, substantial disturbance likely occurred in the early 1960's during the construction of Interstate Route 91, which is located several hundred feet to the east of the site.

Based on the soil borings described in greater detail above, portions of the upper 10 to 14 feet of the Travel Center site consist of sandy fill. Evidence of the original ground level could be clearly seen in several of the borings. Below the fill, layers of naturally deposited silt, sand and gravel were observed. The upper layers are primarily flood sediments, with the lower layers possibly deposited at the time of glacial Lake Hitchcock.

Bedrock outcrops were not observed on the site, but are visible several hundred feet to the northwest of the site across Vermont Route 11. Bedrock geology in the vicinity is quite complex. Bedrock was not encountered in any of the borings done at the site.

Site Hydrogeology

The proximity of the Black River to the south and the Connecticut River to the east is presumed to control the regional direction of groundwater movement. The Travel Center building is located about 600 feet to the north of the Black River. The flow of the Connecticut River in this area is primarily to the southwest and the flow of the Black River is primarily to the southeast.

The water level in the Black River at this location and for some distance upstream is controlled by the level in the Connecticut River, which is under the influence of the New England Power Company dam at Bellows Falls, located several miles downstream. The relative location of the site to these two major streams suggests a likely groundwater gradient across the site to the south or southeast. Groundwater levels likely fluctuate in response to river levels, with a slight lag.

The sounding results of the monitoring wells installed at the site confirm that the predominant direction of groundwater flow is toward the south or southeast. However, an anomaly in the form of slight depression in the water table has been observed in the two monitoring wells exhibiting free product. The depression is most noticeable at monitoring well MW-4, which is near the location of the former leaking fitting on the premium unleaded system. The groundwater levels observed during one of the December sounding events are depicted as contours on the Groundwater Plan included as Appendix G.

The water table gradient is very shallow, approximately 0.02 percent across the entire site. The principal groundwater recharge area is most probably a sand and gravel deposit located northerly of the Howard Johnsons complex. This area has been mined in the past, but is still significantly higher in elevation than the site.

It appears that migration of the free product plume has been limited by the shallow gradient and the silt and silty sand generally found at and above the water table. The southeasterly trend of the free product and dissolved phase plumes appears to be related to a gravel layer observed in MW-2 and MW-4.

Potential Receptors

The Travel Center is supplied with potable water from a well located approximately twenty feet from the southwest corner of the building. This well is clearly located in the dissolved contaminant plume and is in close proximity to the free product plume. A sample was taken from the well on November 17, 1992 and analyzed for BTEX and MTBE analysis by EPA Methods 602 and 8015. No concentrations of these contaminants were detected above the limits for the method of analysis. A copy of the contract laboratory report is included as Appendix H.

Records of well completion reports in the vicinity were obtained from the Vermont Department of Water Resources. There are approximately 66 private water supplies within a 2-mile radius of this site. Almost all of these wells are located at higher elevations and hydrogeologically upgradient of the site. The 11 recorded wells located within one-half mile of the site are shown on the receptor plan and associated table included as Appendix I. It is noted that the Travel Center well does not appear on this list. The closest potential off-site well is the one at the Mobil station across Route 5 to the west. The buildings in the vicinity include the Travel Center, the Mobil Station, Howard Johnsons restaurant and motel, and State equipment storage buildings. All of these buildings are slab on grade construction with frost walls. This type of construction minimizes the potential for vapor migration. There have been no reports of problems with vapors disclosed.

The natural receptors include the wooded wetland to the south of the station, the Black River further to the south, and possibly the Connecticut River one-half mile to the east.

Monitoring Well Sampling

On December 1, 1992, Dufresne-Henry collected groundwater samples for VOC analysis (EPA methods 602/8015) from monitoring wells 1, 3, 5, 6, 7, and 8. Monitoring wells 2 and 4 were not sampled because free product was present on the groundwater surface. A product thickness of approximately 6 inches was observed on the surface of the ground water in MW-2, and 4 inches in MW-4. The product present appeared to be gasoline. A subsequent check for free product on December 30, 1992 showed 1.5 inches in MW-2 only.

A summary table of the sampling results is included as Appendix J, along with a copy of the contract laboratory's analysis report. Copies of the site plan with approximate isoconcentrations of Benzene and Total BTEX are included in Appendix K.

The initial round of sampling results indicates that the dissolved product contamination in the groundwater is confined to a plume about 150 feet wide east to west, and 300 feet long north to south. Based on the relatively low levels of contamination in MW-3 and the lack of contamination in MW-5, there appears to have been very little migration of the plume to the north. This would be expected given likely direction of groundwater flow as discussed in subsequent sections.

The contaminant levels in MW-6 to the west of the leak location and MW-7 near the apparent southeasterly limit of the plume are significant, but also relatively low considering the presence of free product in MW-2 and MW-4.

The lateral extent of the plume to the southwest is not defined because of the lack of a monitoring well in that direction. Also, given the appearance of free product in MW-2, it is possible that the plume could extend to the east of that well farther than would be indicated by the BTEX levels in MW-7.

The BTEX levels in MW-1 clearly indicate that the supply well for the station is located within the dissolved contaminant plume.

The lack of contamination in MW-8 indicates that either the prevailing direction of groundwater movement is not in that direction, or that the dissolved plume has not yet travelled the 400 feet to that well.

Conclusions and Recommendations

Based on the observations at the time of the discovery of the faulty coupling, the lost product indicated by the inventory records, the results of the soil gas survey, observations during soil boring/monitoring well installation, and monitoring well soundings and sampling it is apparent that there is free product present, and contamination to soil air and groundwater at this site.

The free product appears to be limited to an area between 1,000 and 2,000 square feet in the immediate vicinity of the fuel line in which the leak occurred. Significant vadose zone contamination is also apparently limited to this area. The dissolved product plume is more widespread, extending approximately 100 feet to the west and 200 feet to the east of the leak location. The true easterly extent has not been defined. The dissolved plume also extends at least 300 feet to the southeast of the leak location onto land owned by the State of Vermont. The southwesterly extent of the plume has not been adequately defined. There appears to have been little spread of the plume to the north of the leak location. Based on the observations during well installation, the downward migration of the dissolved product plume has been confined by a silt layer which is at a consistent elevation beneath the affected area, which is estimated to be about 1 acre in size.

Based on the above findings, continued monitoring, additional investigation and remedial action is recommended for this site. Additional monitoring wells should be installed to the southwest of the station to help define the extent of the plume in that direction. An additional well should also be installed to the east of MW-2 to better define the extent of the dissolved plume in that direction.

All of the monitoring wells, and the station supply well, should be sampled quarterly and analyzed for BTEX and MTBE. Station personnel should be advised to watch for any changes in the quality of the water at the station. Consideration should be given to the use of bottled water until several rounds of well samples have demonstrated that the station well has not been affected.

In order to verify that the groundwater table is as flat and stable as indicated by the data collected to date, the monitoring wells should be sounded monthly. Sounding should also occur following significant rainfall or melting events. The thickness of free product, if present, should be checked each time the wells are sounded.

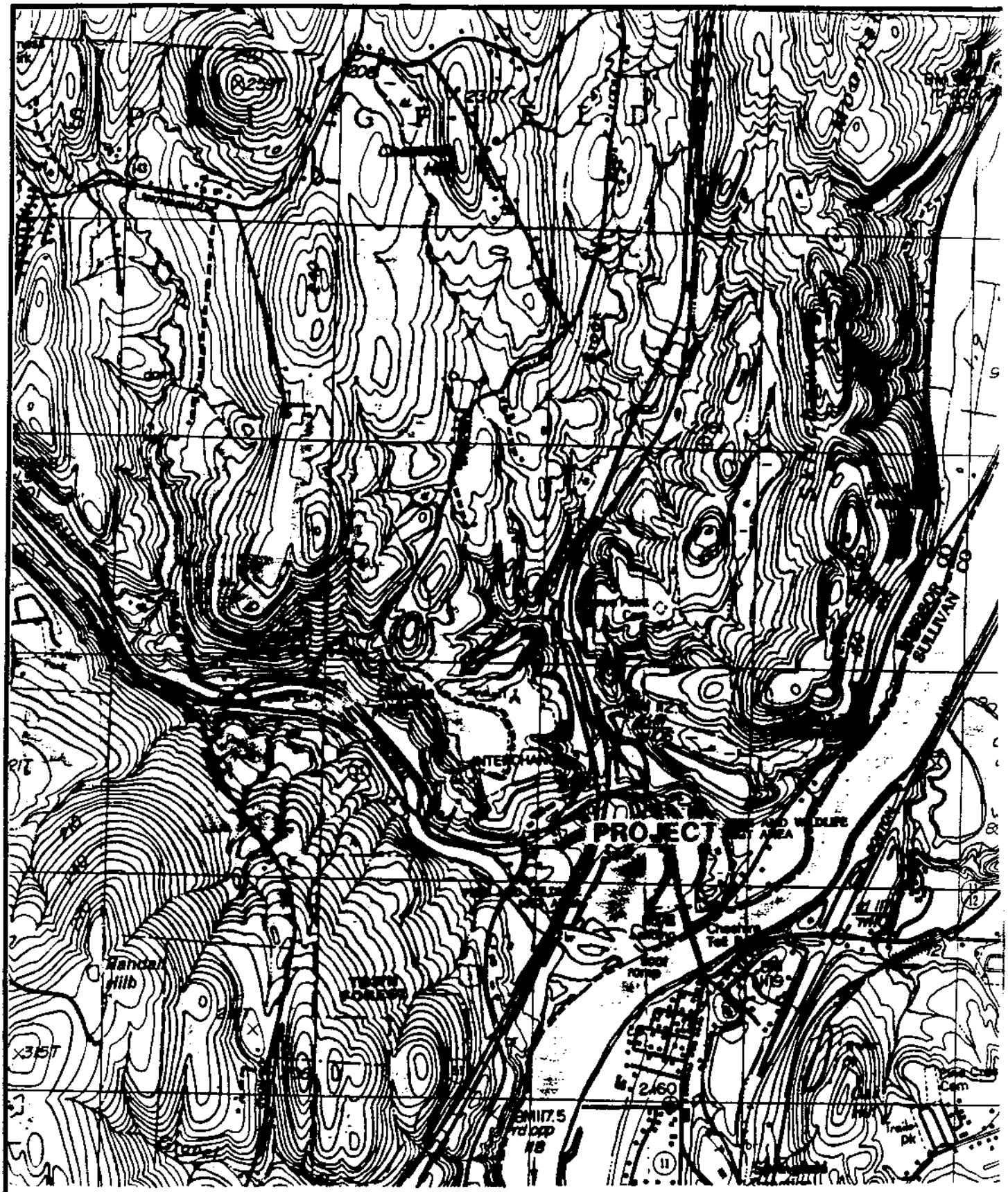
Remedial measures which could be considered are the installation of passive filter canisters and installation of a soil vapor recovery system in the vicinity of the free product plume. New, larger diameter wells would be required for the filter canisters which would be used to accumulate free product that could be removed by station personnel. A vapor recovery system installed a short distance above the water table has been shown to be an effective means of reducing all phases of contamination in the soil air and water, particularly beneath paved areas. Also, Johnson & Dix owns the equipment necessary to put such a system in place,

The effectiveness of these remedial measures would be evaluated by tracking the changes in groundwater quality and decrease in free product thickness.

To track the progress of the remedial work, samples should be taken from the monitoring wells on a quarterly basis during the remedial activities. Also as a precaution, the potable water well on site should be sampled quarterly as well to verify that it has not become impacted as a result of the initial release or due to ground water movement caused by remedial activities.

APPENDIX A

LOCATION MAP



LOCUS PLAN

APPROXIMATE SCALE 1:25000

TAKEN FROM USGS QUAD SHEET FOR SPRINGFIELD, VT

Client No.	462063	JOHNSON & DIX FUEL CORP. I-91 EXIT 7 TRAVEL CENTER SITE ASSESSMENT	Dufresne-Henry Inc.
Proj. Mgr.	F.D.D.		
Date	01/93	SPRINGFIELD, VERMONT	A

BRUNING 44-232 45337-13

APPENDIX B

SOIL GAS SURVEY RESULTS

DH Dufresne-Henry

Dufresne-Henry, Inc.
Precision Park
North Springfield, Vermont 05150
802-886-2261
FAX 802-886-2280

Engineering Disciplines
Civil
Environmental
Transportation
Municipal
Structural
Electrical
Mechanical

Associated Disciplines
Surveying
Construction Management
Applied Sciences
Water Quality
Geologic
Hydrologic
Computer

October 9, 1992

Mr. Ted Uncles
State of Vermont Agency of Natural Resources
Underground Storage Tank Division
103 South Main Street / West Building
Waterbury, Vermont 05671-0404

Re: I-91 Travel Center
Springfield, Vermont
D-H #462015 - TCNTR

Dear Mr. Uncles:

On behalf of Johnson & Dix Fuel Corporation, Dufresne-Henry, Inc., has completed a preliminary review of the I-91 Travel Center, located at the intersections of Vermont Routes 5 and 12 (adjacent to Interstate 91) in Springfield, Vermont.

Dufresne-Henry initially became involved when we were requested to come on-site to review a reported leak from a faulty coupling on an underground pipe and make a preliminary assessment of the extent and severity of the leaked product. This pipe carries premium unleaded fuel from a 10,000 gallon underground tank to the premium dispenser, approximately 110 feet away. The coupling is located approximately 15 feet from the dispenser.

A pressure test had been attempted on this line and the test failed. Gurney Brothers was then contracted by Johnson & Dix Fuel Corporation to expose the piping, find the leak, and then repairs were completed by Beardsley, Inc.

At the time we arrived on site, two excavations had been completed. The first was the UST location along the pipe trench extending towards the dispenser island. This excavation was approximately 20 feet long. The

second excavation extended from the dispenser island towards the tanks approximately 18-20 feet. At the time we arrived, the damaged coupling had been exposed by Gurney Brothers. The Springfield Fire Department had been notified and was on site. Chief Lamphere closed the station operation down while the excavations were open due to the potential for a fire hazard.

We completed scans of the soils in situ with our HNU PI-101 photoionization detector, with a 10.2 eV lamp. In three locations, scans of the soils yielded readings in excess of 200 ppm (pinned needle) on the 0-200 scale, and two readings of >300 ppm on the 0-2000 scale.

We directed the backhoe operator to continue the excavation further to the south to try and determine downgradient extent. However, when the pavement was broken back and fresh soil exposed, the off gases from the soil were strong. We directed that excavation stop, and that we would discuss the situation with your office prior to proceeding with additional investigative work. The repairs were made to the damaged coupling, and the excavation was backfilled.

After repairs were completed, the station was then returned to operation.

On Tuesday, September 29, 1992, we discussed the initial findings of our assessment. You requested that a soil-gas survey be completed. This work was completed on Thursday, October 1, 1992 by Bruce Cox, P.E., staff geologist, and Chris Gates, staff technician, both of Dufresne-Henry. Attached are memoranda regarding the soil gas work and approximate scale drawings of the site depicting the isoconcentrations at 18" and 36" beneath ground surface (BGS). Note that soil-gas work was not attempted in the direction of the station building because of the potential for disturbing existing utilities in the area.

The scans of the soil gas with the HNU indicate the strong presence of gasoline vapors in the substrate. The concentrations are highest in the immediate area of the coupling, and decrease as you proceed further away from the site of release. Scans of vapors from the substrate during the soil gas survey were typically below 100 ppm, however sample points SV-4 and SV-7 had hits exceeding 100 ppm.

We requested Johnson & Dix complete an inventory reconciliation of the premium unleaded fuel at the Travel Center. A copy of the reconciliation for the last twelve months is attached. The cumulative total for product unaccounted for from the premium unleaded system is approximately 2,600 gallons. We have discussed the reconciliation with Johnson & Dix personnel, and they agree that these volumes are representative.

Based on conversations with Johnson & Dix, they are requesting reimbursement for investigative and remedial work from the Petroleum Clean-up Fund for this release. Please advise Dan Freihofer regarding this issue. You may reach him at:

Johnson & Dix Fuel Corporation
240 Mechanic Street
Lebanon, New Hampshire 03766
603/448-4222

If you should have any questions or comments regarding this submittal, please feel free to call.

Very truly yours;

DUFRESNE-HENRY, INC.

Theodore S. Reeves, P.E.
Manager - Environmental Services Division

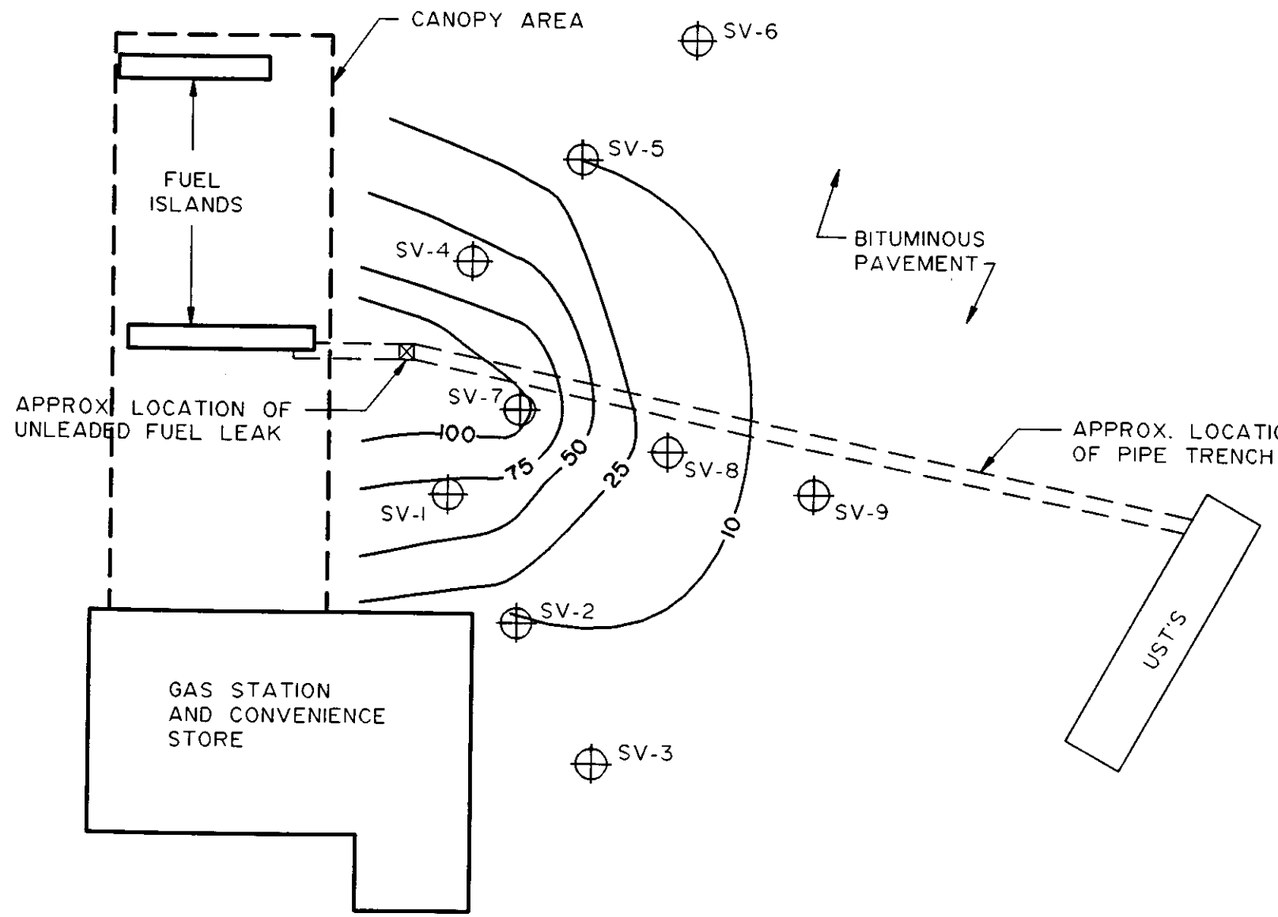
TSR/dim
SMS0511.LTR
attachments

cc: Dan Freihofer - Johnson & Dix Fuel Corporation
Neil Martin - Johnson & Dix Fuel Corporation

Memo to: Files
From: B. Cox
Subject: Johnson & Dix; Exit 7 Texaco
DH 462015
Date: October 5, 1992

On October 1, 1992 Bruce H. Cox, PE and Christopher L. Gates conducted a soil vapor survey at the Exit 7 Texaco in Springfield, VT. The work was in response to a broken fitting in a gasoline distribution line that had been discovered during a pressure test and repaired the previous week. The general sampling locations were discussed with the manager prior to the start of intrusive work.

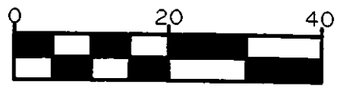
Three sampling lines were run radially from a point about 7 feet east of the pump island closest to the office/store. The lines (in an easterly direction) were parallel to the pump island and approximately 45° north and south of that line. Sampling points were at 20 foot stations and at depths on 18" and 36". A total of 9 locations were sampled; three in each line. The sample probes were 3/4" ID perforated steel pipe. They were driven to the required depth with a sledge hammer. A pilot hole was made through the bituminous concrete pavement using a rotor drill with a 1" bit. The same probe was used for each sampling depth at a given sample station. Three, 5 foot long probes were used in rotation. A new probe was used at each sample station with the others left in the open air to degas. At each sample depth the pipe was evacuated by approximately 150 strokes (15cc/stroke) of a hand operated vacuum pump. A volume from the probe was then pumped into a 1 pint Ziploc bag and analyzed with an HNU PI-101 (10.2 eV lamp). A clean bag was used for each sample. Weather at the time of the investigation was sunny, windy, and with temperatures in the 40's - low 50's. The holes were left open at the completion of the work. The results obtained at each sample location are attached.



LEGEND

- SOIL VAPOR SAMPLE LOCATIONS
- SOIL VAPOR CONCENTRATIONS BY PID (10.2eV LAMP) **18" DEPTH**
- BUILDING

NOTE:
THE INFORMATION ON THIS DRAWING WAS BASED ON FIELD ACTIVITIES OF DUFRESNE-HENRY, SEPTEMBER AND OCTOBER 1992.



APPROXIMATE SCALE 1"=20'

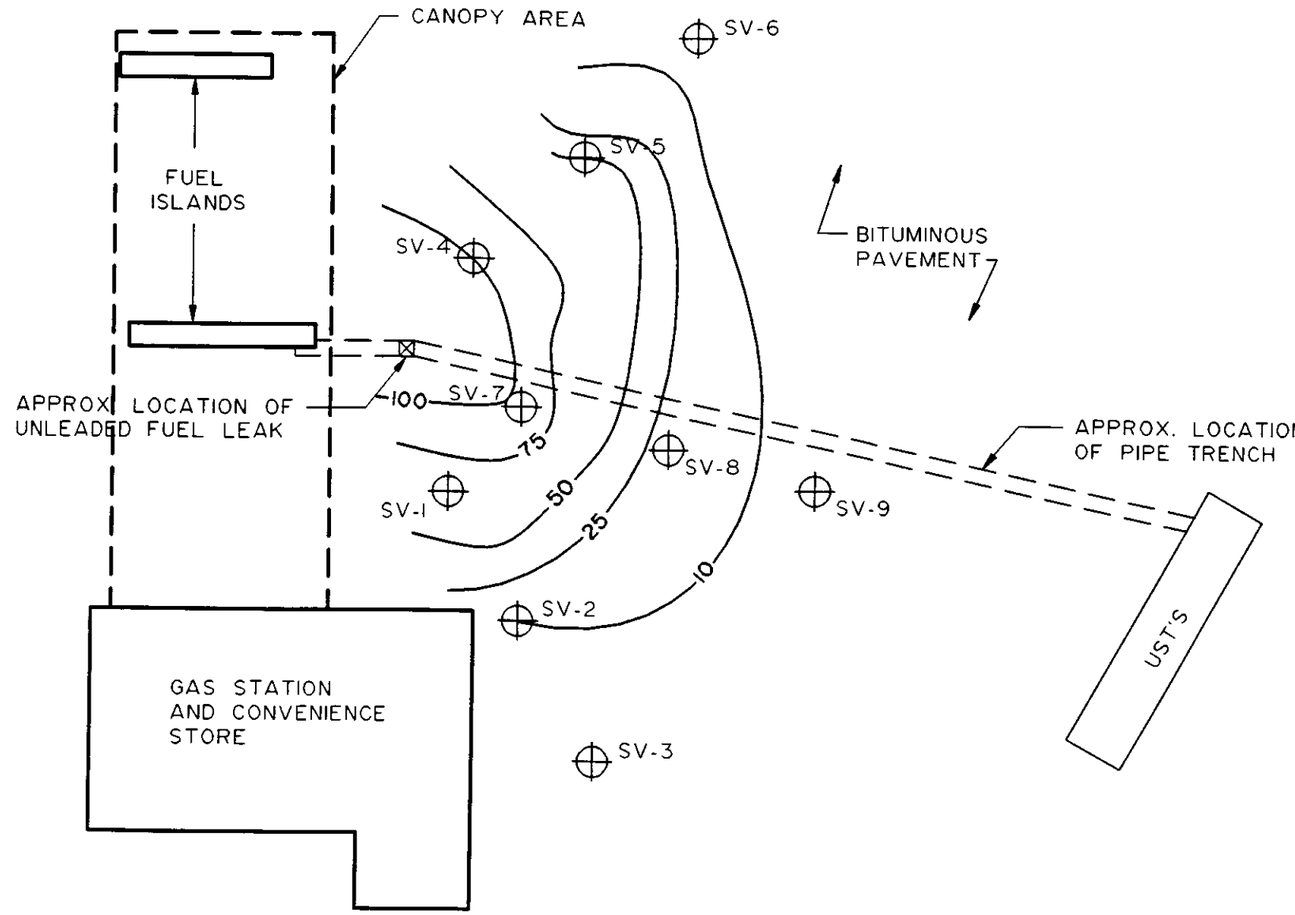
Dufresne-Henry Inc.
Precision Park
No. Springfield,
Vermont 05150

JOHNSON & DIX
TRAVEL CENTER

SOIL GAS ISOCONCENTRATIONS – 18" BGS

SPRINGFIELD, VERMONT

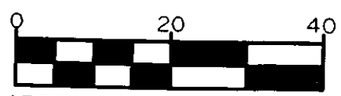
Client No. 462015	Proj.Mgr. T.S.R.	Date 10/92	B	



LEGEND

- SOIL VAPOR SAMPLE LOCATIONS
- SOIL VAPOR CONCENTRATIONS BY PID (10.2eV LAMP) **36" DEPTH**
- BUILDING

NOTE:
THE INFORMATION ON THIS DRAWING WAS BASED ON FIELD ACTIVITIES OF DUFRESNE-HENRY, SEPTEMBER AND OCTOBER 1992.



APPROXIMATE SCALE 1"=20'

Dufresne-Henry Inc.
Precision Park
No. Springfield,
Vermont 05150

JOHNSON & DIX
TRAVEL CENTER

SOIL GAS ISOCONCENTRATIONS – 36" BGS

SPRINGFIELD, VERMONT

Client No. 462015	Proj.Mgr. T.S.R.	Date 10/92	B	

Soil Vapor Sampling Results

Sample Location	Depth	HNU reading (ppm)	Time
SV 1	18"	70	9:35 am
	36"	40 - 50	9:45 am
SV 2	18"	5+	9:55 am
	36"	<5	10:07 am
SV 3	18"	3 - 4	10:22 am
	36"	2+	10:33 am
SV 4	18"	60±	10:45 am
	36"	110+	10:57 am
SV 5	18"	40(?)	11:05 am
	36"	7	11:14 am
SV 6	18"	4	11:26 am
	36"	3	11:38 am
SV 7	18"	110	11:57 am
	36"	100+	12:09 am
SV 8	18"	15 - 20	1:59 pm
	36"	<10	2:11 pm
SV 9	18"	14	2:19 pm
	36"	5 - 6	2:32 pm

Notes:

SV 5, 18" HNU reading probably high due to residual vapor in tubing.

SV 9, 18" HNU reading probably slightly high due to residual vapor in tubing.

APPENDIX C

SITE INVESTIGATION REQUEST HEALTH AND SAFETY PLAN, WORK PLAN, AND APPROVAL

State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Hazardous Materials Management Division
103 South Main Street / West Building
Waterbury, VT 05671-0404
802-244-8702

October 15, 1992

OCT 19 1992

DUFRESNE-HENRY, INC.

Don Friehofer
Johnson & Dix Fuel Corporation
240 Mechanic Street
Lebanon, NH 03776

RE: Petroleum contamination at the I-91 Travel Center in Springfield, Vermont (Site #92-1304)

Dear Mr. Friehofer:

The Sites Management Section (SMS) has reviewed the report by Dufresne-Henry, Inc. dated October 9, 1992 regarding the suspected petroleum release at the above referenced site. As indicated on the suspected release report, the release was first detected by you on September 24, 1992.

Based on inventory reports from the I-91 Travel Center between the months of October, 1991 and September, 1992, it appears that approximately 2,600 gallons of gasoline has leaked from a faulty coupling which carried unleaded fuel 110 feet from an underground storage tank to a premium dispenser. A soil gas survey was performed by Dufresne-Henry on October 1, 1992 and detected high levels of gasoline vapors in the area where the faulty coupling had been located. Strong petroleum odors were discovered during an effort to determine the downgradient extent of the contamination by removing pavement at the site, so the excavation attempt was terminated. Depth to groundwater is currently unknown; however, with the amount of gasoline which has been released, it is likely that groundwater has been impacted and free product may also be present on the water table. The Connecticut River is located within a half mile of the site, and it is also unknown whether or not it has been affected.

Based on this information, the SMS is requesting Johnson & Dix Fuel Corporation to retain the services of a qualified environmental consultant to perform the following:

1. Determine the degree and extent of contamination to groundwater. This may be accomplished by installing a sufficient amount of monitoring wells in locations that effectively determine the extent of contamination, as well as determining if the contamination has the potential to migrate offsite. Samples should be analyzed by EPA Method 8020.

2. Determine if free product is present on the water table and if necessary, develop an active removal plan which addresses this problem.

3. Perform a complete site assessment in order to determine the potential for any sensitive receptors in the area to be affected by the contamination. This should include any nearby public or private drinking water supplies, basements of adjacent buildings, and the previous mentioned Connecticut River.

Preliminary Work Plan
Petroleum Contamination Assessment

I-91 TRAVEL CENTER
SPRINGFIELD, VERMONT

This work plan outlines the tasks and methodologies to be employed during the petroleum contamination assessment at the I-91 Travel Center in Springfield, Vermont. On September 24, 1992 a pressure test detected a leak in a distribution line from a 10,000 gallon underground gasoline storage tank. The source of the break was located and repaired. At that time Dufresne-Henry observed soil readings of 300+ ppm on an HNU PI-101 (10.2 eV lamp). A soil gas survey conducted on October 1, 1992 by Dufresne-Henry yielded several HNU readings of 100+ ppm in the vicinity of the repair. An inventory reconciliation by Johnson & Dix indicates the loss of approximately 2,600 gallons of premium unleaded gasoline in the last twelve months.

A soil boring and monitoring well program is proposed to help define the extent of the contamination plume and provide preliminary hydrogeologic data. The number and location of the borings have been chosen with these purposes in mind. It is anticipated that four (4) wells will be installed at this time. All wells will be field located and referenced to a local benchmark. All borings and monitoring well installations will be performed by T & K Drilling of Troy, New Hampshire under the field supervision of Dufresne-Henry personnel. All personnel on the site are OSHA certified for hazardous site operations under 29 CFR part 1910.120.

BORINGS

It is anticipated that the borings for the monitoring wells will be done using 4 1/4" hollow stem augers. Hollow stem augers offer the advantages of minimal hole caving, ease of geologic sampling, and relatively easy monitoring well installation. They generally are the most cost effective method given the expected subsurface conditions. Monitoring well borings will be taken to a minimum of 5' into the prevailing groundwater table or to refusal, whichever occurs first. The estimated depth of the borings is 20 feet. Petroleum based pipe dope for use on drill rods, tools, or casing will not be allowed. No type of drilling mud, including polymers, will be used. Should flowing sands be encountered, clean water obtained locally will be used to increase hydraulic head. If flowing sands are particularly problematic, casing will be used.

SOIL SAMPLING

Soil samples will typically be taken at 5 foot intervals using a split spoon sampler. It is anticipated that continuous split spoon samples will be taken in one of the borings. Sampling at other intervals may occur and will be a field decision of the Dufresne-Henry inspector. Possible reasons include abrupt changes in drill rate and suspected, or known, zones of contamination. The split spoon sampler allows retrieval of relatively undisturbed soil samples from a known depth for classification and Volatile Organic Compound (VOC) screening. All soil samples and material from the auger flights will be screened for VOC's with an HNU PI-101 photoionization detector (10.2 eV lamp). The act of driving the sampler (Standard Penetration Test) also gives an indication of the density or degree of compaction of the soil. Representative samples from each spoon will be placed in glass jars and retained by

Dufresne-Henry. These are for project records only and are not intended for chemical analysis. Detailed logs of geology, drilling data, and HNU readings will be prepared for each boring. Soil samples for laboratory analysis may be obtained if contaminated soil is encountered. Water quality samples will not be obtained during the boring program.

MONITORING WELLS

Monitoring wells will be constructed from 2", 0.010" or 0.020" machine slotted, threaded, flush joint, Schedule 40 PVC. Assuming no refusal, each monitoring well will consist of 10' of screen with sufficient riser to reach approximately 2" below the surface grade. The bottom of the well will be set such that approximately 5 feet of screen extends above and below the water table observed at the time of installation. For wells with shallow depth to the water table, the screened interval will be a decision of the Dufresne-Henry inspector. The bottom of all wells will be provided with a PVC cap or point, or a plug with an expanding gasket. The annular space between the auger and the screen will be carefully backfilled with clean silica sand to create a filter pack around the well. The filter pack will extend from the bottom of the well to approximately 2 feet above the screen. At that point a seal will be installed consisting of about 1 foot of unhydrated bentonite pellets or chips. The remainder of the hole will be backfilled with native soil to about 2 feet from the surface. Another bentonite seal will be installed and a monitoring well box will be grouted in flush at the surface. All wells will have removable top caps for sampling and sounding.

DECONTAMINATION

The borings may, or may not, be completed within the zone of contamination. However, to prevent cross contamination between the borings, strict decontamination procedures will be followed. All in-ground tools and equipment will be decontaminated by steam cleaning prior to the start of work and between borings. All decontamination will be done on-site at a designated location. Routine cleaning of equipment, such as split spoons, will use water obtained at the facility with disposal on-site. Excess contaminated soil will be stockpiled on-site at a location to be designated by Johnson & Dix. The soil will be placed on a sheet of 6 mil polyethylene and then covered with the same material.

WATER SAMPLING

See attached document.

SITE ASSESSMENT

A site and vicinity walk-over will be performed to determine potential receptors. These will include nearby private and public water supplies, buildings, utilities, and rivers. The operating history of the facility will be investigated to include examining inventory records.

WATER QUALITY SAMPLING TECHNIQUES
Quality Assurance Document

Introduction

Sample collection for groundwater monitoring wells is performed with polyvinyl chloride (PVC) bailers for samples which are analyzed for inorganic parameters, and by Teflon bailers for organic parameters. Surface water samples are hand grab samples. All samples are collected in suitable containers and refrigerated and/or field preserved as appropriate until delivered to a certified laboratory for analysis. Samples are delivered to the laboratory as soon as possible and in all circumstances within the recommended delivery time for specific parameters. A Chain of Custody record is kept for each sample location and sampling occurrence.

Monitoring Wells

The casing and well guard are inspected for signs of vandalism or damage. The condition of the ground surface at the well head is examined for signs of surface water infiltration. Information regarding condition is noted as well as information regarding identification of the lock and key. Well casing diameter is noted. Weather conditions are noted as well as any recent rainfall or drought conditions.

Upgradient wells ("clean") are sampled prior to downgradient wells. Static water level is determined using an electronic water sounder or a tape and weight with an accuracy of ± 0.01 foot. Measurements are recorded to the nearest 0.02 foot from the top of the protective steel casing or monitoring well casing. The PVC bailer is washed with a non-ionic phosphate free detergent and rinsed with distilled water. The depth to the bottom of the well is determined and the volume of water required for purging is calculated. A minimum of three volumes of static water in the well is purged. The purged water is discarded. Teflon bailers are used for sample collection. The Teflon bailers are washed with detergent and rinsed with distilled water between sampling locations.

The color, odor, and turbidity of the sample is noted. Samples are obtained for parameters required for the specific well. An example of the parameters typically obtained immediately after the well has been flushed are: chemical oxygen demand (COD), chloride, and site specific metals. Samples may also be obtained for nitrates, calcium, manganese, sulfates, total organic compounds, total halogenated organic compounds, and volatile organic compounds. If volatile organic analysis (VOA) is required, these samples are obtained first. The VOA sample is slowly released into a clean VOA vial with as little disturbance to the sample as possible. The vial cap is retained in the hand during the process with the Teflon seal protected from all contamination. No free gases are permitted in the sample.

All samples which will be analyzed for dissolved metals and COD are field filtered using a pressurized 0.45u filter. Samples are placed in containers provided by the certified laboratory and labeled with an identification number, date, and method of preservation.

Surface Water Sampling

Hand grab samples are collected at surface water sampling locations. Samples are obtained from mid-depth of the water column in a field cleaned sampling device. Samples which will be analyzed for dissolved metals, COD, and which have observable turbidity are filtered with a 0.045u filter and immediately preserved. Field parameters of temperature, pH, and specific conductance are also measured in the water column. Conditions in the vicinity of the sampling location are noted, depth of sample below water surface, and general flow conditions.

Sample Preservation and Handling

Samples collected which require fixing with preservative chemicals are placed in sample containers with the appropriate reagent. The samples are placed in insulated chests with ice packs or ice. Samples are kept refrigerated until they are delivered to the laboratory no later than allowable according to the holding times determined by Standard Methods. Sampling personnel contact the laboratory personnel regarding sampling delivery and analysis.

Record Keeping

Field data sheets are utilized to reconstruct sampling conditions at any time after sampling. These sheets shall contain all information regarding the site: name, date, time of sampling, weather, ambient air temperature, identification numbers, and sampler's name. Field data is to include information regarding the condition of the well head and casing, well specifics (total depth, static water level, diameter, length of casing above grade, volume of water purged), sampling date (equipment used, depth sample obtained, physical properties of sample), field measurements of pH, conductivity, temperature, and the number and type of sample containers.

Chain of custody record for all samples shall be maintained. A sample shall be considered to be in the custody of an individual if it is in the direct view of, or otherwise controlled by, the individual in custody. Storage of samples during custody shall be accomplished according to established preservation techniques in appropriately sealed and numbered storage containers. Chain of custody shall be maintained during the exchange of the samples or sealed sample container directly transferred from one individual to the next with the former custodian witnessing the signature of the recipient on the chain of custody record. Chain of custody forms shall contain the following information: sample location names, field identification numbers, signature of collector, date and time of collection, number of containers transferred, parameters for analysis, all signatures of individuals involved in the chain of possession, description of sample condition, and any comments regarding sample collection.

Quality Assurance and Control

To check the integrity of field sampling and equipment cleaning techniques, the following field control procedures are used. Field blanks, and occasionally trip blanks, are used as control or external QA/QC samples to detect contamination that may be introduced in the field (atmospheric or from sampling equipment), in transit to or from the sampling site, during bottle preparation, and sample log-in or storage.

A "trip blank" follows all samples through the sampling period. The trip blank is prepared at the laboratory using organic-free water and is kept with the sample containers and samples at all times. It is not opened and is analyzed with the other samples obtained. If this sample is accidentally opened, it is noted in the chain of custody records. The trip blank is commonly used for quality control on volatile organic analyses.

A "field blank" is collected after sampling a well that previously indicated high concentrations of the water quality parameters analyzed. The sampling equipment is cleansed and a sample of distilled water is obtained using the sampling equipment. The distilled water sample is then used to prepare the field blank.

A sample replicate is used periodically to provide quality assurance for the laboratory analysis techniques. A sample is split in the field and provided to the laboratory in two or more sampling containers.

Decontamination of Field Equipment

All field equipment is rinsed with de-ionized or distilled water. This includes the electronic water sounder probe, the bailer winch spool, Teflon coated bailer wire, filter unit, and bailers. In addition, the bailers are disassembled, washed with a non-phosphate detergent, and rinsed with distilled water.

Site Health and Safety

All sampling personnel shall receive an annual medical examination to determine the baseline physiological condition. Appropriate blood chemistry work and x-rays are taken as required.

Protective clothing is worn by all site technicians during sampling. This clothing includes protective rubberized overalls, rubber gloves, and steel-toed boots. Full-face respirators with organic filter cartridges, combustible gas and oxygen detection meters, and photoionization detectors are available for the sampler's protection.

Upon arrival at the site a visual survey is performed to determine the safety of the work place. No water quality testing is performed if there is any evidence of hazardous waste disposal or the uncovering of suspected hazardous materials. Upon arrival at a monitoring well location, the cap is removed from an upwind position. The well head is allowed to vent for at least five minutes while sampling equipment is set up. No smoking or use of flammable materials is permitted adjacent to a well head.

Data Transaction, Reduction and Report Generation

Data analysis and interpretation are the responsibility of the Project Manager or Project Team member responsible for a particular task of the project. The data are compiled in table form for ease of presentation to highlight the significant information. The data may be input into the computer and plotted on various types of graphs and maps, or analyzed by various statistical methods.

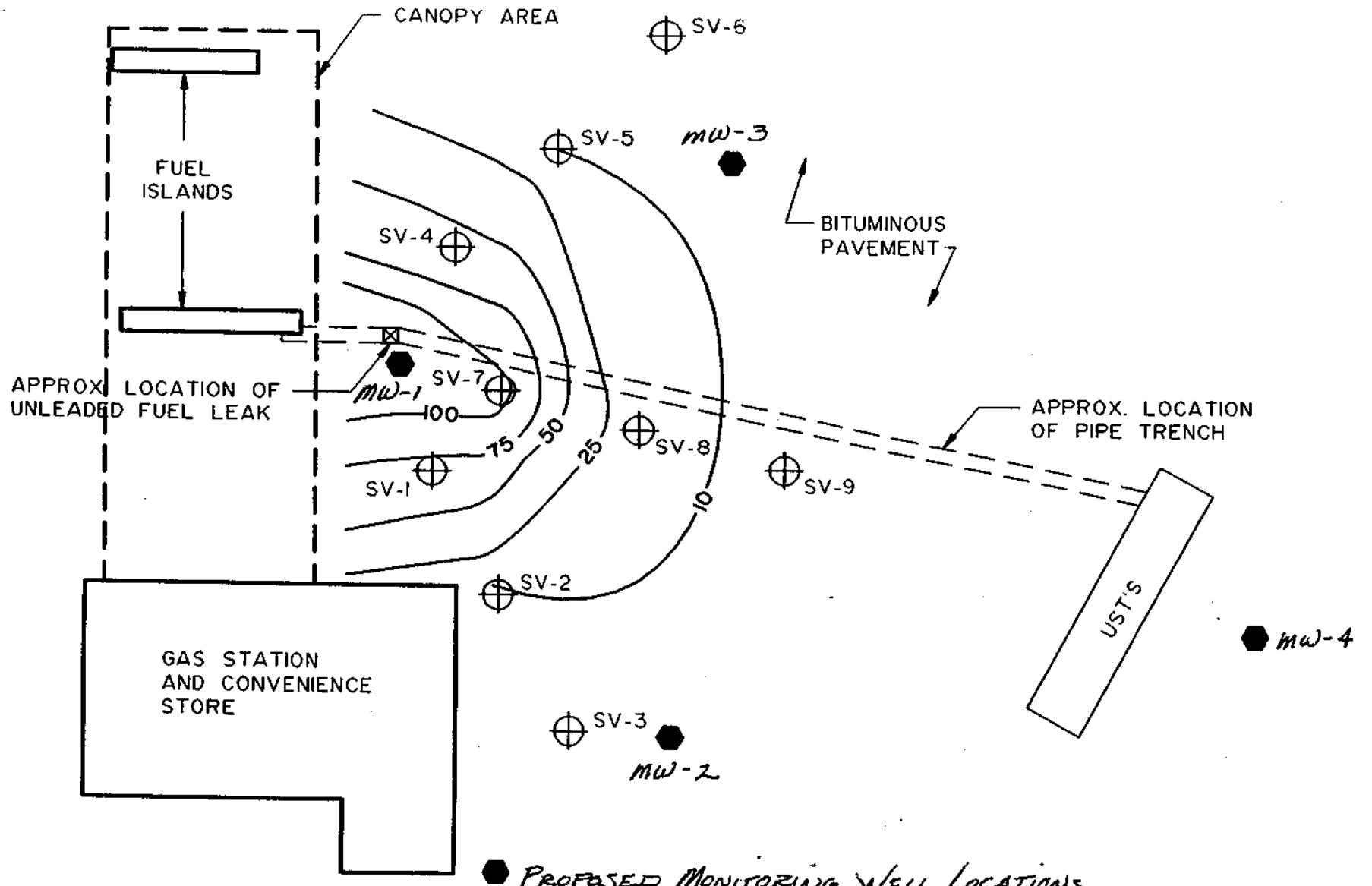
Sampling Protocol Addendum for: I-91 Travel Center
Springfield, Vermont

1. The person(s) sampling the wells will utilize an HNU photoionization detector. Immediately upon removal of the well cap, the HNU will be used to make a preliminary determination as to the VOC activity in the well.

2. A Teflon bailer will then be lowered into the well to check for the presence of free product floating on the groundwater surface. If free product is found, the well will be purged until product ceases to be observed. The well will be allowed to recover and be repurged and checked for free product. If free product is again observed, no water quality samples will be taken. If free product is not observed, the well will be sounded, purged, and sampled as outlined above.

3. Water samples will be forwarded to a contract laboratory. Analysis will be for VOC's including "BTEX" and MTBE by EPA method 602/8020 and for Total Petroleum Hydrocarbons by EPA method 418.1.

4. Soil samples recovered from split spoon samples will be screened with an HNU PI-101 PID using the "Jar/Headspace" method. Samples will be placed in a one quart jar, filling the jar approximately one-half full, and covered with aluminum foil. The samples will be allowed to volatilize for five minutes. At that time, the probe of the HNU will pierce the foil and the sample scanned. Results of each scan shall be recorded and reported on the boring logs.



Dufresne-Henry Inc.
Precision Park North Springfield 0515

SOIL GA

SPRINGFIELD

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

HEALTH AND SAFETY PLAN
FOR

MONITORING WELL INSTALLATION AND SAMPLING

I-91 EXIT 7 TRAVEL CENTER

SPRINGFIELD, VERMONT

This Health and Safety Plan applies only to Dufresne-Henry, Inc. employees.

PROPOSED ON-SITE ACTIVITIES:

Installation of five (5) or six (6) monitoring wells, decontamination, and water sampling.

PROPOSED DATE(S) OF WORK:

ANTICIPATED WEATHER CONDITIONS: temperatures in the 30's and 40's, light wind, possible snow or rain.

PROPOSED SITE INVESTIGATION TEAM:

Personnel	Responsibilities
Theodore Reeves	Project Manager
Bruce Cox	Site Safety Officer
Bruce Cox	Field Team Leader
Dan Freihofer	Site Representative
Parminder Grewal	ANR Representative

All Dufresne-Henry, Inc. personnel arriving or departing the Site should check in and out with the Site Safety Officer. All Dufresne-Henry activities on-Site must be cleared through the Field Team Leader or Project Manager.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

Background Information

Site Status: __X__ Active _____ Inactive _____ Unknown

Site Description:

The site is located west of Exit 7 on I-91 at the corner of US Rte 5 and Vt Rte 11. The site consists of a convenience store, two (2) dispenser islands, one (1) underground kerosene tank (size unknown), and four (4) 10,000 gallon underground storage tanks; 3 gasoline and 1 diesel. Known on-site utilities consist of the piping and electrical service for the dispensers and building.

Site History:

The complete site history is not known at this time. The site has been used as a gas station for at least 10 years. A leak was recently discovered as outlined in the section below. An inventory reconciliation indicates the loss of approximately 2,600 gallons of gasoline.

Field Monitoring or Sampling Data From Previous Site work:

A distribution line leak was discovered during pressure testing in September 1992. The source of the leak was found and repaired. At that time Dufresne-Henry observed soil readings of 300+ ppm on an HNU PI-101 (10.2 eV lamp). A soil gas survey conducted by Dufresne-Henry in October 1992 yielded several HNU readings of 100+ ppm in the vicinity of the leak. Since that time all the distribution lines have been replaced.

No other monitoring or sampling data is known to exist.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

HAZARD REFERENCE

Waste Types:

__X__ Liquid __X__ Solid _____ Sludge __X__ Vapor _____ Unknown

Waste Characteristics:

_____ Corrosive __X__ Ignitable _____ Radioactive

__X__ Volatile _____ Toxic _____ Reactive

_____ Unknown _____ Other _____ Persistent

Specific Substances of Greatest Concern (if known): Gasoline or other petroleum products.

Hazard Evaluation:

Task: Mon. Well Installation __X__ Low _____ Medium _____ High

Identification of Hazards: Gasoline or other petroleum products.

Task: Decon. __X__ Low _____ Medium _____ High

Identification of Hazards: Gasoline or other petroleum products.

Task: Sampling __X__ Low _____ Medium _____ High

Identification of Hazards: Gasoline or other petroleum products.

Task: _____ Low _____ Medium _____ High

Identification of Hazards:

Other Physical Hazards: (weather, heavy equipment, site structures...)

Drill rig, traffic, weather

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

Hazard Assessment:

OVERALL HAZARD: _____ Serious _____ Moderate __X__ Low

_____ Unknown

On-Site Control

Site control is necessary to minimize potential exposure of workers to hazardous waste/materials, protect the public from the Site's chemical and physical hazards, and to facilitate work activity. The procedures to be followed involve the establishment of Site work zones, Site security, and safe work practices.

The on-Site staging area and support zone has been established at:

The Travel Center building.

The personal contamination reduction zone (decon area) has been established at:

The area easterly of the Travel Center building.

During the intrusive work, the exclusion area will be defined as follows:

The drill rig and a 15 foot radius around the boring.

The decontamination of sampling and/or heavy equipment will be conducted:

The area easterly of the Travel Center building.

These sub-regions of on-Site control have been established in order to reduce the potential cross contamination and proliferation of contamination by potentially contaminated equipment and personal protective equipment.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

SITE ACTIVITIES

Required Personal Protective Equipment (PPE)

Task	Entry Level of Protection	Monitoring Equipment	Upgrade/Downgrade Contingency
Well Install.	D	HNU PI-101 Explosimeter O2 meter H2S meter	Upgrade to Level C with HNU readings over 10 ppm for 5 minutes in breathing space.
Decon.	D	"	"
Sampling	D	"	"

Note: Breathing space HNU readings of 50 ppm, explosimeter readings over 25% of the LEL, O2 deficiency or enrichment, or H2S readings will result in shutting down the job and consulting with State officials and the client.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

Specific protective equipment for each level of protection is as follows:

Level C: Full Face Respirator w/appropriate cartridge (Willson T45)
Chemically Resistant Suit (Tyvek)
Outer Rubber Slush Boots
Outer Chemically Resistant Gloves
Surgical Gloves
Hard Hat
Steel Toe/Shank Work Boots

Modified Level D: Chemically Resistant Suit (Tyvek)
Outer Rubber Slush Boots
Outer Chemically Resistant Gloves
Surgical Gloves
Hard Hat
Steel Toe/Shank Work Boots
Safety Glasses or Face Shield

Level D: Work Clothes
Steel Toe/Shank Work Boots
Surgical Gloves
Hard Hat

Rationale for change in level of protection:

Upgrade to Level C with HNU readings of 10 ppm or more for 5 minutes in the breathing space.
HNU readings of over 50 ppm in the breathing space, explosimeter readings of over 25% of the LEL, O2 deficiency or enrichment, or H2S readings will result in shutting down the job and consulting with State officials and the client.

NO CHANGES TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE APPROVAL OF THE SITE SAFETY OFFICER OR DESIGNEE.

Monitoring Procedures

Site Monitoring Equipment:

__X__ HNU (Model PI-101, 10.2 eV probe)
__X__ Explosimeter
_____ Draeger Tube & Pump
__X__ O2 Meter
__X__ Other: H2S meter

Methods and Frequency of Monitoring:

Air space and soil samples will be monitored with an HNU PI-101.
Air space will be monitored with an explosimeter/O2 meter/H2S meter.
Frequency: Soil samples; as obtained.
Air; not to exceed every 15 minutes.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

Decontamination and Disposal

Personnel Decontamination Procedure:

_____ Level C: Slush boot and glove wash, slush boot and glove rinse, tape removal, outer glove removal, (cartridge change), slush boot removal, suit removal, inner glove removal.

_____ Modified Level D: Slush boot and glove wash, slush boot and glove rinse, slush boot removal, suit removal, glove removal.

Equipment Decontamination:

The drill rig and tools will be decontaminated by steam cleaning prior to the start of work and between borings. All decontamination will be done on-site. Routine washing of split spoon samplers, etc will use water obtained at the facility with disposal on-site.

Disposal Procedure for Investigation-Derived Materials:
(decon waste, disposables)

All decon waste and disposables will remain on-site.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

SITE OPERATING PROCEDURES/SAFETY GUIDELINES

** Always observe the buddy system. Never enter or exit site alone, and never work alone in an isolated area. Never wander off by yourself.

** Always maintain a line-of-sight.

** Practice contamination avoidance. Never sit down or kneel, never lay equipment on the ground, avoid obvious sources of contamination such as puddles, and avoid unnecessary contact with on-site objects

** No eating, drinking, or smoking outside the designated "clean" zone.

** In the event PPE is ripped or torn, work shall stop and PPE shall be removed and replaced as soon as possible.

** Be alert to any unusual changes in your own condition; never ignore warning signs. Notify Health and Safety Coordinator as to suspected exposures or accidents.

** A vehicle will be readily available exclusively for emergency use. All personnel going on-site shall be familiar with the most direct route to the nearest hospital.

** In the event of direct skin contact, the affected area shall be washed immediately with soap and water.

** Copies of the Health and Safety Plan shall be readily accessible at the command post.

** Note wind direction. Personnel shall remain upwind whenever possible during on-site activities.

** Never climb over or under refuse or obstacles. Use safety harness/safety lines when sampling lagoons, stream beds, and ravines with steep banks.

** Hands and face must be thoroughly washed before eating, drinking, etc.

** Any modifications to this safety plan MUST be approved by the Site Safety Officer.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

Special Procedures:
Confined Space Entry

__X__ No attempt will be made to enter abandoned buildings, manholes, tanks, or any other confined areas.

_____ Other:

Personnel Monitoring: (If applicable: Heat stress, frostbite, air sampling of individual breathing zone)

Monitoring of individual breathing space will be monitored by an HNU PI-101, explosimeter, O2 meter, and H2S meter as outlined in monitoring procedures.

EMERGENCY SITUATIONS

The following standard emergency procedures will be used by Dufresne-Henry on-site personnel. The Site Safety Officer (SSO) shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed.

Personnel Injury to Dufresne-Henry Employees in the Exclusion Zone

Upon notification of an injury to a Dufresne-Henry employee in the exclusion zone, a rescue team will enter the zone (if required) to remove the injured person to the hotline. The SSO and Project Manager should evaluate the nature of the injury, and the affected person should be decontaminated to the extent possible prior to movement to the support zone. The SSO shall arrange for appropriate first aid, and contact should be made for an ambulance and with the designated medical facility (if required). No Dufresne-Henry personnel shall re-enter the exclusion zone until the cause of the injury or symptoms are determined.

Personnel Injury to Dufresne-Henry Employees in the Support Zone

Upon notification of an injury to a Dufresne-Henry employee in the support zone, the Project Manager and SSO will assess the nature of the injury. If the cause of the injury or loss of the injured person does not affect the performance of site personnel, operations may continue, with the on-site Field Team Leader initiating the appropriate first aid and necessary follow-up as stated above. If the injury increases the risk to others, all Dufresne-Henry personnel shall move to the decon line for further instructions. Dufresne-Henry activities on-site will cease until the added risk is removed or minimized.

Fire/Explosion

Upon notification of a fire or explosion on-site, all Dufresne-Henry personnel will assemble at the decon line. The fire department shall be alerted and all Dufresne-Henry personnel moved to a safe distance from the involved area.

Personal Protective Equipment Failure

If any Dufresne-Henry site personnel experience a failure or alteration of protective equipment that effects the protection factor, that person and his/her buddy shall immediately leave the exclusion zone. Re-entry shall not be permitted until the equipment has been repaired or replaced.

Other Equipment Failure

If any other equipment on-site fails to operate properly, the Project Manager and SSO shall be notified and then determine the effect of this failure on continuing operations on-site. If the failure affects the safety of on-site Dufresne-Henry personnel or prevents the completion of the tasks, all Dufresne-Henry personnel shall leave the exclusion zone until the situation is evaluated and appropriate actions taken.

In all situations, when an on-site emergency results in evacuation of the exclusion zone, Dufresne-Henry personnel shall not re-enter until:

1. The conditions resulting in the emergency have been corrected.
2. The hazards have been reassessed.
3. The Site Safety Plan has been reviewed.
4. Dufresne-Henry personnel have been briefed on any changes in the Site Safety Plan.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

EMERGENCY INFORMATION

AMBULANCE: Springfield — Phone: (802) 885 - 4545

HOSPITAL: Springfield Hospital
Ridgewood Road
Springfield, Vermont
(see attached map) — Phone: (802) 885 - 2151

POLICE: Springfield — Phone: (802) 885 - 2113

FIRE DEPARTMENT: Springfield — Phone: (802) 885 - 4545

POISON CENTER: Burlington — Phone: (802) 658 - 3456

ANR INCIDENT RESPONSE: Office — Phone: (802) 244 - 8702

CORPORATE:

Dufresne-Henry N. Springfield, VT — Phone: (802) 886-2261

Project Manager: Ted Reeves
Home Phone: (802) 263 - 5525

NEAREST PHONE: Travel Center

LOCATION OF ON-SITE FIRST AID KIT: Boring contractor's vehicle.

EMERGENCY VEHICLE: The designated emergency vehicle on-site shall be that of the Dufresne-Henry, Inc. representative.

PROJECT: I-91 TRAVEL CENTER
JOB NO.: 462063

The following individuals have read this safety document and are familiar with its contents, site conditions, and on-site safety procedures (please sign below):

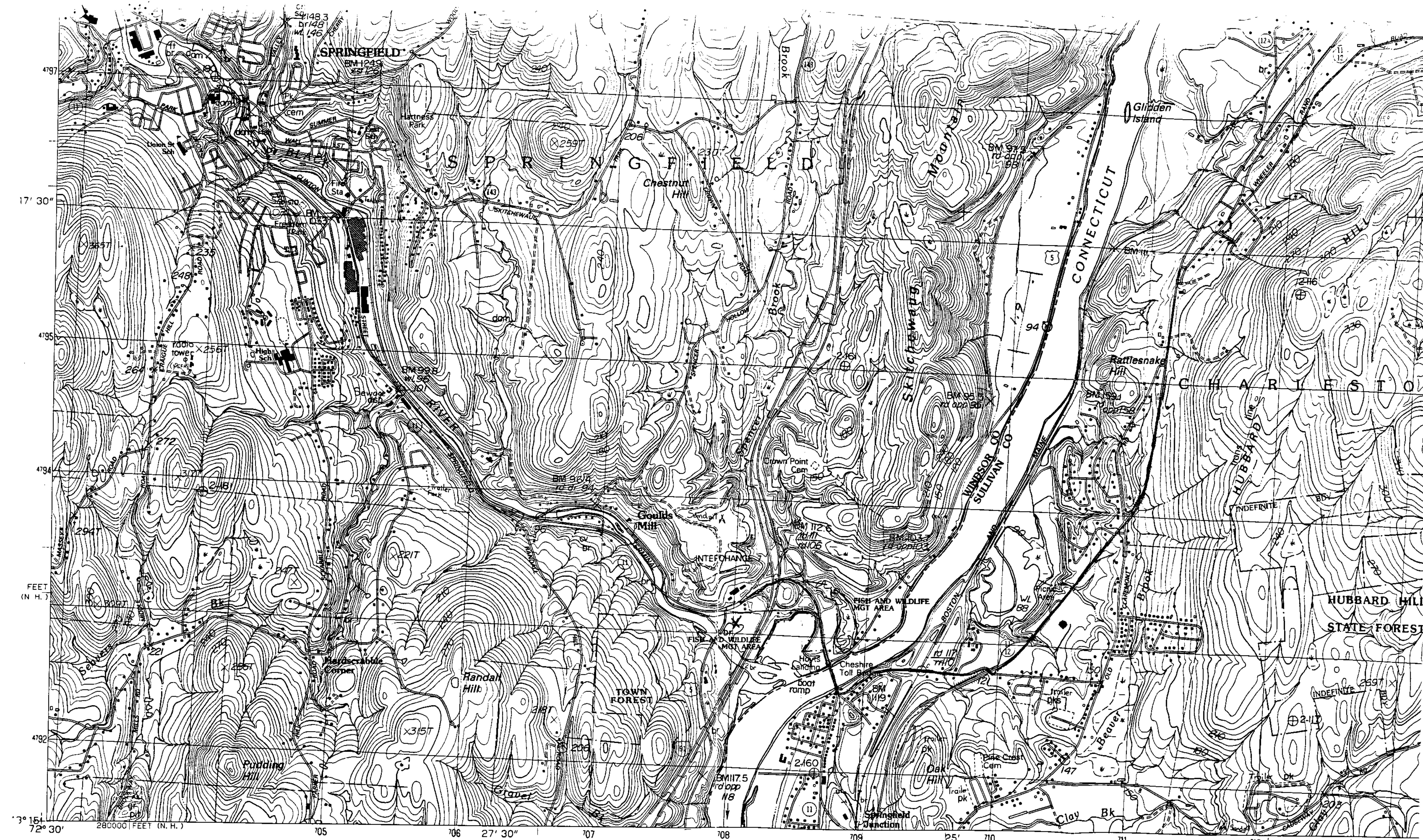
	Company
Theodore Reeves	Dufresne-Henry, Inc.
Bruce Cox	Dufresne Henry, Inc.
Peter Aldrich	Dufresne-Henry, Inc.
Myron Domingue	Soils Engineering, Inc.
Richard Holmes	Soils Engineering, Inc.

Copies of this SSP have been given to:

Approval Signatures:

PM _____

Div. Dir. _____



INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1984

KILOMETERS 1 .5 0 1 2 3 4

MILES 1 .5 0 1 2

SCALE

1 CENTIMETER ON THE MAP REPRE

CONTOUR INTE

State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation

Hazardous Materials Management Division
103 South Main Street / West Building
Waterbury, VT 05671-0404
802-244-8702

November 2, 1992

Theodore S. Reeves, P.E.
Dufresne-Henry, Inc.
Precision Park
North Springfield, Vermont 05150

RE: Work plan for I-91 Travel Center, Springfield (Site #92-1304)

Dear Mr. Reeves:

The work plan for the I-91 Travel Center has been reviewed by the Sites Management Section (SMS). As discussed earlier, if high levels of contamination are found during the installation of the proposed monitoring wells, then additional wells should be installed as deemed fit by field personnel. There is also a concern about the added cost of using a separate method to test for MTBE. Many in-state labs include MTBE in the 602 analysis. The additional test will not be applicable to any deductible or reimbursed by the Petroleum Clean-up Fund (PCF) should the site be included in the PCF at a later date. The PCF can only reimburse costs considered to be competitive.

Please keep the SMS informed as to when the work will be occurring at the site. Feel free to call if you have any questions or concerns.

Sincerely,

Parminder K. Grewal, Site Manager
Sites Management Section

cc: Dan Friehofer
Stanley Patch

PG/letters/I-91-wp.let

APPENDIX D

D-H BORINGS LOGS AND WELL INSTALLATION REPORT

Johnson & Dix Fuel Corp
I-91 Travel Center
Springfield, Vermont

11/16/92

Checked HNU calibration at 7:30 am - OK.
Dufresne-Henry, Inc. - Bruce Cox on site at 7:53 am.
Soils Engineering, Inc. - Myron Domingue, Richard Holmes on site at 8:30 am±.

MW 1

Started boring at 8:50 am. The rig and tools had been steam cleaned prior to arrival on-site. All water for cleaning split spoons and other tools was obtained at the Travel Center. During drilling, air quality was periodically monitored with an HNU PI-101 (10.2 eV lamp). Drilled with 4 1/4" hollow stem augers taking continuous split spoon samples. All samples were screened for VOC's with the HNU. Representative soil samples (not for chemical analysis) from each split spoon were stored in clear glass jars and retained by Dufresne-Henry. Faint - moderate gasoline or fuel oil odors were noted from about 15' to 29'. HNU readings as high as 120 ppm were observed from samples headspaced at ambient temperatures. Total depth of the boring was 30' with no refusal. The water table was encountered at about 19'. Samples for possible bacteria analysis were obtained from the 17' - 19' and the 19' - 20' split spoon samples. The samples were placed in a cooler at the site and in a refrigerator upon returning to the office. The general geologic section consists of silty sand and gravelly sand fill to about 14'. The original ground surface was encountered from 13'8" - 14'6". Below that point to 29' is silty sand and gravelly sand. From 29' - 30' is silt. Only very slight odors were observed from the bottom 1' of silt. As the limit of contamination appeared to have been reached and to prevent penetration of the lower restrictive layer, the boring was stopped at 30'. Installed a 2" dia, .020" machine slotted, threaded, flush joint SCHD 40 PVC well at 30'. All pipe came from factory sealed plastic bags. The annular space was backfilled with clean silica sand to 9'. A bentonite pellet seal was installed from 8' - 9'. A 10" monitoring well box was grouted in flush with the surface. All excess soil was stored on-site at the previously established stockpile. Finished at 12:35 pm.

Materials: 20' of 2", .020" slot, threaded, flush joint, SCHD 40 PVC.
9'10" of 2", solid wall, threaded, flush joint, SCHD 40 PVC.
450 lb± of silica sand.
25 lb± of bentonite pellets.
40 lb± of concrete mix.
2 push-on PVC caps.
1 10" monitoring well box.

MW 2

Started boring at 1:20 pm. Clean augers (not previously used on the job) were used. The bit and split spoon were cleaned using ALCONOX. All water for cleaning spoons and other tools was obtained at the Travel Center. During drilling, air quality was periodically monitored with an HNU PI-101 (10.2 eV lamp). Drilled with 4 1/4" hollow stem augers taking split spoon samples at five foot intervals. All samples were screened for VOC's with the HNU. Representative soil samples (not for chemical analysis) from each split spoon were stored in clear glass jars and retained by Dufresne-Henry. Faint - very

strong gasoline odors were noted from about 11' to 30'. HNU readings as high as 180 ppm were observed (20' - 22' sample) from samples headspaced at ambient temperatures. Total depth of the boring was 32' with no refusal. The water table was encountered at about 17'. The general geologic section consists of silty sand and gravelly sand fill to about 11'. The original ground surface was encountered from 11' - 12'. Below that point to 27' is silty sand and gravelly sand. From 27' - 32' is silt. Only very slight odors were observed from the bottom 2' of silt with HNU readings of 10 ppm. As the limit of contamination appeared to have been reached and to prevent penetration of the lower restrictive layer, the boring was stopped at 32'. Installed a 2" dia, .020" machine slotted, threaded, flush joint SCHD 40 PVC well at 30'. All pipe came from factory sealed plastic bags. The annular space was backfilled with clean silica sand to 7.6'. A bentonite pellet seal was installed from 6.6' - 7.6'. A 10" monitoring well box was grouted in flush with the surface. All excess soil was stored on-site at the previously established stockpile. Finished at approximately 3:30 pm.

Materials: 20' of 2", .020" slot, threaded, flush joint, SCHD 40 PVC.
9'10" of 2", solid wall, threaded, flush joint, SCHD 40 PVC.
400 lb± of silica sand.
25 lb± of bentonite pellets.
65 lb± of concrete mix.
2 push-on PVC caps.
1 10" monitoring well box.

Steam cleaned augers and downhole tools at 3:50 pm.

Visitors: Parminder Grewal (VT SMS)
Ted Reeves (D-H)
Stanley Patch (property owner)
Neil Martin (Johnson & Dix)
Weather: Mostly sunny, 20's - 30's am, 30's pm, calm - very light wind.
BHC left site at 3:55 pm (steam cleaning in progress).

11/17/92

Dufresne-Henry, Inc. (BHC) on site at 8:05 am.
Soils Engineering, Inc. (MD, Mark Clark am, RH pm) already on site.

BHC took a sample of the tap water in the Travel Center. The cold water tap in a utility sink was allowed to run for 5 minutes before sampling. Samples were collected in two 40 ml VOC vials at 8:20 am. The samples were placed in a cooler and picked up at the site by Ted Reeves (D-H) in the morning.

MW 3

Started boring at 8:30 am±. The rig and tools had been steam cleaned the previous afternoon. All water for cleaning spoons and other tools was obtained at the Travel Center. During drilling, air quality was periodically monitored with an HNU PI-101 (10.2 eV lamp). Drilled with 4 1/4" hollow stem augers taking split spoon samples at five foot intervals. All samples were screened for VOC's with the HNU. Representative soil samples (not for chemical analysis) from each split spoon were stored in clear glass jars and retained by Dufresne-Henry. Very faint gasoline or fuel oil odors were noted at about 20' with trace HNU readings observed from samples headspaced at ambient temperatures. Total depth of the boring was 32' with no refusal. The water table was encountered at about 19'. The general geologic section consists of silty sand and gravelly sand fill to about 10'. The original

ground surface was encountered from 10'4" - 10'10". Below that point to 32' is silty sand and silt. Installed a 2" dia, .020" slot, threaded, flush joint SCHD 40 PVC well at 30'. All pipe came from factory sealed plastic bags. The annular space was backfilled with clean silica sand to 13'. A bentonite pellet seal was installed from 12' - 13'. A 10" monitoring well box was grouted in flush with the surface. All excess soil was stored on-site at the previously established stockpile. Finished at 11:10 am.

Materials: 15' of 2", .020" slot, threaded, flush joint, SCHD 40 PVC.
14'10" of 2", solid wall, threaded, flush joint, SCHD 40 PVC.
400 lb± of silica sand.
25 lb± of bentonite pellets.
65 lb± of concrete mix.
2 push-on PVC caps.
1 10" monitoring well box.

MW 4

Started boring at 11:20 am±. Clean augers were used. The bit and split spoon were cleaned with ALCONOX. All water for cleaning spoons and other tools was obtained at the Travel Center. During drilling, air quality was periodically monitored with an HNU PI-101 (10.2 eV lamp). Drilled with 4 1/4" hollow stem augers taking split spoon samples at five foot intervals. All samples were screened for VOC's with the HNU. Representative soil samples (not for chemical analysis) from each split spoon were stored in clear glass jars and retained by Dufresne-Henry. Strong - very strong gasoline odors were noted from just below the pavement to approximately 32'. HNU reading of up to 180 ppm were observed from samples headspaced at ambient temperatures. Total depth of the boring was 32' with no refusal. The water table was encountered at about 25'. The general geologic section consists of silty sand and gravelly sand fill to about 11.5'. The original ground surface was encountered from 11'6" - 12'+. Below that point to about 31'10" is silty sand with gravel layers. Silt with a slight gasoline odor was observed from 31'10" - 32'. As the limit of contamination appeared to have been reached and to prevent penetration of the confining layer, the boring was stopped at 30'. Installed a 2" dia, .020" machine slotted, threaded, flush joint SCHD 40 PVC well at 31'9". All pipe came from factory sealed plastic bags. The annular space was backfilled with clean silica sand to 12.2'. A bentonite pellet seal was installed from 11' - 12.2'. A 10" monitoring well box was grouted in flush with the surface. All excess soil was stored on-site at the previously established stockpile. Finished at 3:00 pm±.

Materials: 15' of 2", .020" slot, threaded, flush joint, SCHD 40 PVC.
16'7" of 2", solid wall, threaded, flush joint, SCHD 40 PVC.
300 lb± of silica sand.
25 lb± of bentonite pellets.
40 lb± of concrete mix.
2 push-on PVC caps.
1 10" monitoring well box.

MW 5

Started boring at 3:10 pm. The location was moved into the parking lot from the originally proposed location to avoid electrical wires presumably buried near the edge of pavement. The augers, bit, split spoon, and other tools used in MW 3 were cleaned with ALCONOX prior to use. All water for cleaning spoons and other tools was obtained at the Travel Center. During drilling, air

quality was periodically monitored with an HNU PI-101 (10.2 eV lamp). Drilled with 4 1/4" hollow stem augers taking split spoon samples at five foot intervals. All samples were screened for VOC's with the HNU. Representative soil samples (not for chemical analysis) from each split spoon were stored in clear glass jars and retained by Dufresne-Henry. No contamination (visual or odor) was observed in the samples or on the tools. No HNU readings were observed. The boring was advanced to 17' and work ceased for the day. The general geologic section to that depth consists of silty sand and gravelly sand.

Visitors: Neil Martin
Weather: Light - moderate snow, 30's, calm - very light wind.
Left site at 4:14 pm.

11/18/92

Dufresne-Henry, Inc. (BHC) on site at 7:51 am.
Soils Engineering, Inc. (MD, RH) on site at 7:52 am.

MW 5 (continued)

No contamination (visual or odor) was observed in the samples or on the tools. An HNU reading of 1 ppm was observed from the 20' - 22' sample headspaced at ambient temperatures. Total depth of the boring was 32'. The general geologic section below 17' consists of sand and sandy gravel to about 28' with silt to the depth of the boring. Installed a 2" dia, .010" machine slotted, threaded, flush joint, SCHD 40 PVC well at 30'. All pipe came from factory sealed plastic bags. The annular space was backfilled with clean silica sand to 13'. A bentonite seal was installed from 12' - 13'. A 10" monitoring well box was grouted in flush with the surface. Finished at 10:50 am±.

Materials: 15' of 2", .010" slot, threaded, flush joint SCHD 40 PVC
14'10" of 2", solid wall, threaded, flush joint, SCHD 40 PVC.
375 lb± of silica sand.
25 lb± of bentonite pellets.
50 lb± of concrete mix.
2 push-on PVC caps.
1 10" monitoring well box.

MW 6

Started boring at 11:02 am. The augers, bit, split spoon, and other tools used in MW 5 were cleaned with ALCONOX prior to use. All water for cleaning spoons and other tools was obtained at the Travel Center. During drilling, air quality was periodically monitored with an HNU PI-101 (10.2 eV lamp). Drilled with 4 1/4" hollow stem augers taking split spoon samples at five foot intervals. All samples were screened for VOC's with the HNU. Representative soil samples (not for chemical analysis) from each split spoon were stored in clear glass jars and retained by Dufresne-Henry. Unusual antiseptic-like(?) odors were observed in samples between 14'6" and 21'. HNU readings of up to 20 ppm were obtained from headspacing samples at ambient temperatures. The total depth of the boring was 32' with no refusal to depth. The water table was encountered at about 20'. The general geologic section consists of silty sand and silt to the depth of the boring. Installed a 2" dia, machine slotted (lower 10' .020", upper 5' .010"), threaded, flush joint, SCHD 40 PVC well at 30'. The annular space was backfilled with clean silica sand to 13'. A bentonite pellet seal was installed from 12' - 13'. A 10" monitoring well box

was grouted in flush with the surface. All excess soil was disposed of at the previously established stockpile.

Materials: 15' of 2", .020" and .010" machine slotted, threaded, flush joint SCHD 40 PVC.
14'10" of 2", solid wall, threaded, flush joint, SCHD 40 PVC.
350 lb± of silica sand.
25 lb± of bentonite pellets.
80 lb± of concrete mix.
2 push-on PVC caps.
1 10" monitoring well box.

Steam cleaned augers, split spoons, and other tools on-site.
BHC contacted Hugh Sullivan of New England Power Co. to obtain permission to install one or two wells between the Travel Center and the Black River. Mr. Sullivan informed me that NEP no longer owns the land; it was deeded to the State of Vermont in 1974 via a quit claim deed as part of the land acquisition for I-91. I informed Ted Reeves of this development. I tried to contact Parminder Grewal but she was out for the day. I went to the Springfield Town Office and found the deed. The deed is to the State, but no mention is made of the agency with jurisdiction. I met with Kim Royer (wildlife biologist) at the District I and II environmental office in Springfield to determine if Fish & Wildlife has jurisdiction. She was unsure but would check.

I informed Soils Engineering of this development and that work would have to cease until permission was obtained from the jurisdictional agency. The work is tentatively scheduled for 11/23/92.

Visitors:
Weather: Overcast, 20's - 30's, light wind.

11/19/92 - 11/20/92

I contacted Parminder Grewal and advised her of the problems we were having. She said she would find out what she could. Per information provided by Parminder Grewal I contacted Ms. Julia Lewis of the VT AOT, right-of-way division for assistance in determining ownership and jurisdiction for the land in question. It was determined that the VT AOT has jurisdiction of the land. She suggested that I contact Alan Remick of the AOT District #2 office in Brattleboro for help. Per discussions with Mr. Remick and Bill Moyse I was told that a permit application would need to be filed. I was told that the work could be done without the permit in-hand, but it would have to be filed. The application was received on 11/23/92 and given to Neil Martin of Johnson & Dix for signing on 11/25/92.

11/23/92

Dufresne-Henry, Inc. (BHC) on site at 8:00 am.
Soils Engineering, Inc. (MD, RH) already on site.

MW 7

Started boring at 9:30 am±. The rig and tools had been steam cleaned on 11/18/92. All water for cleaning spoons and other tools was obtained at the Travel Center. During drilling, air quality was periodically monitored with an HNU PI-101 (10.2 eV lamp). Drilled with 4 1/4" hollow stem augers taking continuous split spoon samples. All samples were screened for VOC's with the

HNU. Representative soil samples (not for chemical analysis) from each split spoon were stored in clear glass jars and retained by Dufresne-Henry. Faint - moderate fuel oil odors were noted from about 11' to 14'. HNU readings as high as 2 ppm were observed from samples headspaced at ambient temperatures. Total depth of the boring was 16' with no refusal. The water table was encountered at about 2'. The general geologic section consists of silt, sand, and gravelly sand to the depth of the boring. As the limit of contamination appeared to have been reached and to prevent penetration of the confining layer, the boring was stopped at 16'. Installed a 2" dia, .020" machine slotted, threaded, flush joint SCHD 40 PVC well at 15'. All pipe came from factory sealed plastic bags. The annular space was backfilled with clean silica sand to 4'. A bentonite pellet seal was installed from 3' - 4'. A locking, protective, stick-up steel casing was grouted in. All excess soil was left at the site of the well.

Materials: 10' of 2", .020" slot, threaded, flush joint, SCHD 40 PVC.
7' of 2", solid wall, threaded, flush joint, SCHD 40 PVC.
225 lb± of silica sand.
25 lb± of bentonite pellets.
40 lb± of concrete mix.
2 push-on PVC caps.
1 protective steel casing and padlock.

MW 8

Started boring in pm. Clean augers were used. The bit and split spoon were cleaned with ALCONOX. All water for cleaning spoons and other tools was obtained at the Travel Center. During drilling, air quality was periodically monitored with an HNU PI-101 (10.2 eV lamp). Drilled with 4 1/4" hollow stem augers taking spilt spoon samples at various intervals depending on the conditions encountered. All samples were screened for VOC's with the HNU. Representative soil samples (not for chemical analysis) from each split spoon were stored in clear glass jars and retained by Dufresne-Henry. Very faint fuel oil(?) odors were noted below 27'. Augered to 30' but did not sample due to excessive flowing sand and gravel. Trace HNU readings were obtained from samples headspaced at ambient temperatures. Total depth of the boring was 30' with no refusal. The water table was encountered at about 17'. The general geologic section consists of silt and sand to about 9', wood and organics (possibly an old burn pile) to 17'+, foul smelling silty organic matter to about 24', and probable silty sand and gravel to the depth of the boring. The boring was stopped at 30' due to flowing sand and gravel causing tools to stick in the augers. Installed a 2" dia, .020" machine slotted, threaded, flush joint SCHD 40 PVC well at 28'. All pipe came from factory sealed plastic bags. The annular space was backfilled with clean silica sand to 16.7'. A bentonite pellet seal was installed from 15.5' - 16.7'. ALL EXCESS SOIL WAS LEFT AT THE SIDE OF THE WELL.

Materials: 10' of 2", .020" slot, threaded, flush joint, SCHD 40 PVC.
20' of 2", solid wall, threaded, flush joint, SCHD 40 PVC.
250 lb± of silica sand.
25 lb± of bentonite pellets.
40 lb± of concrete mix.
2 push-on PVC caps.
1 protective steel casing and padlock.

Visitors: Neil Martin (Johnson & Dix)
F. David Deane (D-H)
Weather: Overcast am, 50's, rain pm, 40's, calm - light wind.
Left site at 4:30 pm.

11/24/92

BHC picked up the samples and left the site.
SEI finished grouting in the steel casing and steam cleaned the equipment.

BORING LOCATION MW 1 INCLINATION V BEARING DATE START/FINISH 11/16/92 / 11/16/92

CASING ID CORE SIZE TOTAL DEPTH 30 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 99.61 DEPTH TO WATER/DATE 20± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
97.11	2.5						4" SSA	4 1/2"/FB	0" - 3" BITUMINOUS CONCRETE. 3" - 2'6" Medium brown silty SAND.
95.11	4.5	SS 1	7 9 11 9	2	14	24			2'6" - 4' Medium gold brown, medium dense silty SAND. Very fine - occasionally medium grained, moderately well sorted, predominately quartz sand. 20% - 30% non plastic fines. Trace of mica. Dry-slightly moist. No odor or staining. 0 ppm. 4' - 4'6" Medium brown, medium dense SAND. Fine - medium grained, moderately well sorted, predominately quartz sand. 10%± non plastic fines. 20%± fine, rounded gravel 1/8" - 1/2". Dry. No odor or staining. 0 ppm.
93.11	6.5	SS 2	7 4 6 9	2	17	24			Medium brown, loose - medium dense, silty SAND similar to above but slightly coarser overall. Sand contains some rock fragments. Dry. No odor or staining. 0 ppm.
91.11	8.5	SS 3	9 4 5 7	2	17	24			Light - medium brown, medium dense SAND and silty SAND. Fine - medium grained, moderately poorly sorted sand top 18", medium grained, well sorted sand bottom 6". Occasional thin (1/2"±) medium brown, horizontal silty sand layers. 20% non plastic fines in upper 18". Trace fine, rounded gravel. Slightly moist. No odor or staining. 0 ppm.
89.11	10.5	SS 4	7 5 3 3	2	19	24			8'6" - 9'6" Medium brown, medium dense, gravelly, silty SAND similar to above. Slightly moist. No odor or staining. 0 ppm. 9'6" - 10'6" Medium - dark brown, medium dense, silty SAND. Very fine - fine grained, well sorted sand. 30% - 40% non plastic fines. Trace very fine gravel to 1/8", trace very small wood fragments, trace mica. Slightly moist. No odor or staining. 0 ppm.
87.11	12.5	SS 5	6 4 4 3	2	14	24			Medium brown, loose - medium dense, gravelly, silty SAND. Predominately fine - medium grained, predominately quartz sand. 20%± non plastic fines 10% - 20% fine, rounded gravel. Trace mica. Dry-slightly moist. No odor or staining. 0 ppm.
85.11	14.5	SS 6	4 3 4 4	2	16	24			12'6" - 13'8" Medium brown, loose, gravelly, silty SAND as above. No odor or staining. 0 ppm. 13'8" - 14'6" Medium - dark brown, loose (medium stiff) SILT. Non plastic fines. Trace roots. Apparent original ground. Slightly moist. Slight organic odor. Trace ppm.
84.61	15						4 1/4" HSA	8"/CCH	Probable SILT as above.
			3						Medium brown, loose, slightly sandy, inorganic

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

SSA = Solid Stem Auger
HSA = Hollow Stem Auger
FB = Finger Bit
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/16/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 1 INCLINATION V BEARING DATE START/FINISH 11/16/92 / 11/16/92

CASING ID CORE SIZE TOTAL DEPTH 30 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 96.11 DEPTH TO WATER/DATE 20± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
82.61	17	SS 7	3 4 4	2	18	24			SILT. 10%± very fine grained sand. Slightly moist. Very faint gasoline-like odor. 1 ppm.
80.61	19	SS 8	6 3 4 5	2	20	24			Medium - dark gray brown, loose, slightly sandy inorganic SILT as above. Non - very slightly plastic fines. Wet. Faint gasoline-like odor, no staining. 2 ppm.
79.61	20	SS 9	5 3	2	12	12			Medium - dark gray brown, loose, slightly sandy inorganic SILT as above. Occasional medium gray splotches. Trace very fine roots, trace mica. Wet - saturated bottom 3"±. Faint gasoline odor, no staining. 3 - 4 ppm.
77.61	22	SS 10	3 3 3 5	2	20	24			20' - 21'6" Medium - dark gray brown SILT as above. Saturated. Slight gasoline odor. 19 ppm. 21'6" - 22' Medium gray brown silty SAND. Very fine - fine grained, well sorted sand. 30%± non plastic fines. Abundant, thin medium orange mottles. Saturated.
75.61	24	SS 11	6 7 12 30	2	17	24			22' - 22'3" Medium brown gray, medium dense, silty SAND. Very fine - medium grained, moderately well sorted, predominately quartz sand. 10% - 20% non plastic fines. Trace mica. Saturated. Moderate gasoline odor, no staining. 120 ppm. 22'3" - 24' Medium brown gray sandy GRAVEL. Very fine - medium grained sand. 50%+ rounded gravel 1.8" - 1"±. 10%+ on plastic fines. Saturated. Moderate gasoline odor, no staining. 50 ppm.
74.61	25	SS 12	30 17	2	12	12			Medium brown gray, very dense, gravelly SAND. Fine - very coarse grained, poorly sorted, rounded sand of quartz and rock fragments. 30%± rounded gravel 1/8 " - 2". Saturated. Moderate gasoline odor, no staining. 50 - 70 ppm.
72.61	27	SS 13	3 20 13 13	2	14	24			Dark gray, medium dense - dense, gravelly SAND. Medium - very coarse grained, poorly sorted, rounded sand of quartz and rock fragments. 10%± non plastic fines. 20%+ rounded gravel to 1/2". Saturated. Oily odor. 1 ppm.
71.11	28.5						4 1/4" HSA	8"/CCH	Probable SAND and GRAVEL as above.
69.61	30	SS 14	3 6 6	2	18	18			28'6" - 29' SAND and GRAVEL similar to above. 29 - 30' Medium brown gray, medium dense, slightly sandy, inorganic SILT. Non plastic fines. 10%± very fine grained sand. Saturated. No odor or staining. 0 ppm.
									No refusal to depth.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

HSA = Hollow Stem Auger
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/16/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 1 INCLINATION V BEARING DATE START/FINISH 11/16/92 / 11/16/92

CASING ID CORE SIZE TOTAL DEPTH 30 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 96.11 DEPTH TO WATER/DATE 20± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
									Set 15' of 2", .020" slot, threaded, flush joint SCHD 40 PVC at 30'. Sand backfill to 9'. Bentonite seal 8' - 9'. Grouted in flush monitoring well box.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/16/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 2 INCLINATION V BEARING DATE START/FINISH 11/16/72 / 11/16/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 98.51 DEPTH TO WATER/DATE 17± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
96.51	2	SS 1	5 7 6 6	2	18	24			Medium brown, medium dense, silty SAND. Very fine - fine grained, well sorted sand. 40%± non plastic fines. Trace, fine weathered schist fragments. Dry. No odor or staining. 0 ppm.
93.51	5						4 1/4" HSA	8"/CCH	Silty SAND as above.
91.51	7	SS 2	4 9 7 6	2	20	24			5' - 6'10" Medium brown, medium dense, silty SAND Very fine - occasionally medium grained, moderately well sorted, predominately quartz sand. 20%± non plastic fines. Trace very fine gravel to 1/8" Dry. No odor or staining. 0 ppm. 6'10" - 7' Medium gray SAND as above. 0 ppm.
88.51	10						4 1/4" HSA	8"/CCH	Probable silty SAND as above.
86.51	12	SS 3	7 6 6 4	2	13	24			10' - 11' Light - medium gray, medium dense, silty SAND. Very fine - fine grained, well sorted sand. 20%± non plastic fines. Trace mica. Slightly moist. Very slight gasoline odor. 11' - 12' Medium - dark brown, medium dense, sandy, inorganic SILT. Non plastic fines. 10%+ very fine grained sand. Slightly moist. Slight - moderate gasoline odor, no staining. 40 ppm.
83.51	15						4 1/4" HSA	8"/CCH	Probable sandy SILT similar to above.
81.51	17	SS 4	2 3 4 7	2	20	24			Medium brown, loose - medium dense, inorganic SILT Non plastic fines. Wet - saturated at bottom. Faint gasoline odor. 20+ ppm.
78.51	20						4 1/4" HSA	8"/CCH	Probable SILT as above changing to GRAVEL at 19'±.
76.51	22	SS 5	11 36 23 34	2	12	24			Medium gray brown, dense - very dense, sandy GRAVEL. Fine - very coarse grained, very poorly sorted sand of quartz and rock fragments. 10%+ non plastic fines. 70% rounded gravel 1/4" - 2". Saturated. Very strong gasoline odor with some sheen observed. 180 ppm.
73.51	25						4 1/4" HSA	8"/CCH	Probable SAND and GRAVEL similar to above.
71.51	27	SS 6	11 9 9 7	2	14	24			25' - 26'11" Dark gray - black, medium dense, sandy GRAVEL similar to above but coarser grained overall. Saturated. Strong gasoline odor, no staining. 100 ppm. 26'11" - 27' Medium brown SILT. Saturated. No apparent odor, no staining.
68.51	30						4 1/4" HSA	8"/CCH	Probable SILT similar to above.
			2 2						Medium brown, very loose - loose, slightly sandy, inorganic SILT. Non plastic fines. Trace mica.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

HSA = Hollow Stem Auger
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/16/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 2 INCLINATION V BEARING DATE START/FINISH 11/16/92 / 11/16/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 98.51 DEPTH TO WATER/DATE 17± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
66.51	32	SS 7	4 5	2	16	24			10%± very fine grained sand. Saturated. Very slight gasoline odor, no staining. 10 ppm.

No refusal to depth.

Set 15' of 2", .020" slot, threaded, flush joint SCHD 40 PVC at 30'. Sand backfill to 7.6'. Bentonite seal 6.6' - 7.6'. Grouted in flush monitoring well box.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/16/92 PROJECT: 462063

LOG OF BORING: MW 2

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 3 INCLINATION V BEARING DATE START/FINISH 11/17/92 / 11/17/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 98.81 DEPTH TO WATER/DATE 20± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
98.31	.5						4" SSA	4 1/2"/FB	0" - 3" BITUMINOUS CONCRETE. 3" - 6" Medium brown gravelly SAND.
96.31	2.5	SS 1	9 10 12 13	2	14	24			Medium brown gray, medium dense - dense, gravelly SAND. Very fine - medium grained, moderately well sorted sand. 20%± non plastic fines. 20%± gravel to 2"+. Dry. No odor or staining. 0 ppm.
93.81	5						4 1/4" HSA	8"/CCH	Medium brown silty SAND.
91.81	7	SS 2	12 15 17 16	2	17	24			Light - medium brown, medium dense - dense, silty SAND. Very fine - rarely medium grained, moderately well sorted, predominately quartz sand. 20% - 30% non plastic fines. 10%± fine, rounded gravel, predominately 1/8" - 1/2" (rarely to 1"). Dry - slightly moist. No odor or staining. 0 ppm
88.81	10						4 1/4" HSA	8"/CCH	Probable silty SAND similar to above.
86.81	12	SS 3	3 5 4 5	2	20	24			10' - 10'4" Medium brown, silty SAND as above. 10'4" - 12' Medium - dark brown, loose SILT. Non plastic fines. 10%± very fine grained sand. Trace mica, trace fine roots. Appears to be original ground. Slightly moist. No odor or staining. 0 ppm.
83.81	15						4 1/4" HSA	8"/CCH	Probable SILT and silty SAND.
81.81	17	SS 4	5 5 5 5	2	18	24			Light - medium brown gray, loose - medium dense, silty SAND. Very fine - fine grained, well sorted predominately quartz sand. 40%± non plastic fines Trace of roots at top. Dry - slightly moist. No odor or staining. 0 ppm.
78.81	20						4 1/4" HSA	8"/CCH	Probable silty SAND similar to above.
76.81	22	SS 5	2 4 6 15	2	24	24			20' - 21'7" Medium gray and brown gray, loose - medium dense, sandy SILT. Very fine - fine grained, well sorted sand. 50%+ non plastic fines. Trace mica. Abundant medium - dark orange mottles Saturated. No odor or staining. Trace ppm. 21'7" - 22' Medium gray SAND. Medium - very coarse grained, rounded, poorly sorted sand. Trace non plastic fines. Saturated. No odor or staining. Trace ppm.
73.81	25						4 1/4" HSA	8"/CCH	Probable SAND similar to above.
71.81	27	SS 6	11 8 6 11	2	6	24			Medium gray SAND over 2" of fine GRAVEL over 1" of medium gray sandy SILT. Saturated. No odor or staining.
68.81	30						4 1/4" HSA	8"/CCH	Probable sandy SILT similar to above.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

SSA = Solid Stem Auger
HSA = Hollow Stem Auger
FB = Finger Bit
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/17/92 PROJECT: 426063

LOG OF BORING: MW 3

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 3 INCLINATION V BEARING DATE START/FINISH 11/17/92 / 11/17/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 98.81 DEPTH TO WATER/DATE 20± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
66.81	32	SS 7	3 8 10 9	2	16	24			Medium gray, medium dense, inorganic SILT. Non - very slightly plastic fines. Trace mica, very fine grained sand. Saturated. No odor or staining. 0 ppm.

No refusal to depth.

Set 15' of 2", .020" slot, threaded, flush joint SCHD 40 PVC at 30'. Sand backfill to 13'. Bentonite seal 12' - 13'. Grouted in flush monitoring well box.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/17/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 4 INCLINATION V BEARING DATE START/FINISH 11/17/92 / 11/17/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 99.31 DEPTH TO WATER/DATE 23± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
94.31	5						4" SSA	4 1/2"/FB	0" - 3" BITUMINOUS CONCRETE. 3" - 5' Light brown and gray, gravelly silty SAND
92.31	7	SS 1	4 14 20 37	2	24	24			5' - 5'9" Light brown gray, loose, sandy SILT. 5'9" - 7' Light brown gray, dense - very dense, sandy SILT. 10% - 20% very fine grained sand. Non plastic fines. Trace fine gravel. Dry. Disinfectant-like odor, no staining. 180 ppm.
89.31	10						4 1/4" HSA	8"/CCH	Probable silty SAND or sandy SILT similar to above
87.31	12	SS 2	2 5 5 6	2	18	24			10' - 11'4" Light brown gray, loose - medium dense, sandy SILT as above. Dry. 11'4" - 11'6" Medium brown SAND. Fine - medium grained, well sorted sand. Trace non plastic fines. Dry. 11'6" - 12' Dark brown, loose - medium dense, sandy SILT. 20%± very fine grained sand. Non plastic fines. Organic soil (apparent original ground). Trace roots, mica. Slightly moist. Very strong gasoline odor, no staining. 100 - 140 ppm.
84.31	15						4 1/4" HSA	8"/CCH	Probable sandy SILT or silty SAND similar to above
82.31	17	SS 3	4 3 4 4	2	24	24			15' - 15'3" Dark brown sandy SILT as above. 15'3" - 17' Medium - dark brown, loose, sandy, inorganic SILT. Non plastic fines. 10%± very fine grained sand. Moist - wet bottom 3"±. Strong gasoline odor, no staining. 150 - 180 ppm.
79.31	20						4 1/4" HSA	8"/CCH	Probable SILT as above changing to GRAVEL at 19'±.
77.31	22	SS 4	18 26 14 10	2	13	24			Medium brown gray, medium dense - dense, sandy GRAVEL. 20% - 30% fine - very coarse grained, poorly sorted, rounded sand of quartz and rock fragments. Rounded gravel 1/8" - 2"±. Trace non plastic fines. Dry. Moderate - strong gasoline odor, no staining. 100+ ppm.
74.31	25						4 1/4" HSA	8"/CCH	Out of gravel at 24'±.
72.31	27	SS 5	4 5 6 9	2	19	24			Light - medium gray, loose - medium dense, slightly gravelly SAND. Fine - very coarse grained (predominately medium - coarse grained), moderately well sorted, rounded sand of quartz, feldspar, and rock fragments. Occasional layers of 1/8" - rarely 1" gravel. Trace non plastic fines. Saturated. Moderately strong gasoline odor, sheen in top of spoon. 140 ppm.
69.31	30						4 1/4" HSA	8"/CCH	SAND and GRAVEL similar to above.
			19						30' - 31'10" Medium gray brown, medium dense,

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

SSA = Solid Stem Auger
HSA = Hollow Stem Auger
FB = Finger Bit
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/17/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 4 INCLINATION V BEARING DATE START/FINISH 11/17/92 / 11/17/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 99.31 DEPTH TO WATER/DATE 23± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
			8						gravelly SAND simialr to above but slightly coarser overall. Saturated. Slight - moderate gasoline odor, no staining. 60 - 80 ppm.
		SS 6	9	2	24	24			
67.31	32		11						31'10" - 32' Medium - dark brown gray SILT. Saturated. Slight gasoline odor, no staining.
									No refusal to depth.
									Set 15' of 2", .020" slot, threaded, flush joint SCHD 40 PVC at 30'. Sand backfill to 12.2'. Bentonite seal 11' - 12.2'. Grouted in flush monitoring well box.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/17/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 5 INCLINATION V BEARING DATE START/FINISH 11/17/92 / 11/18/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 100.71 DEPTH TO WATER/DATE 24± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
96.21	4.5						4" SSA	4 1/2"/FB	0" - 3" BITUMINOUS CONCRETE 3" - 4'6" Light - medium brown, silty SAND.
94.21	6.5	SS 1	19 27 21 25	2	24	24			Light - medium brown, dense, silty SAND. Very fine - fine grained, well sorted, predominately quartz sand. 10% - 20% non plastic fines. 10%± fine, rounded gravel 1/8" - 1/4". Trace mica, mafic minerals. Dry. No odor or staining. 0 ppm
90.71	10						4 1/4" HSA	8"/CCH	Probable silty SAND similar to above.
88.71	12	SS 2	2 14 23 22	2	18	24			10' - 11'10" Light - medium brown, dense, silty SAND similar to above, but with 40%± non plastic fines. Dry. No odor or staining. 0 ppm. 11'10" - 12' Light - medium gold brown, sandy SILT. Non plastic fines. 30%± very fine grained sand.
85.71	15						4 1/4" HSA	8"/CCH	Probable silty SAND similar to above with gravel from 13' - 14'±.
83.71	17	SS 3	6 5 5 5	2	19	24			15' - 16'4" Medium brown, loose - medium dense, silty SAND similar to above. Slightly moist. No odor or staining. 0 ppm. 16'4" - 17' Medium - dark brown, loose, sandy SILT. Non plastic fines. 10% - 20% very fine grained sand. Moist to damp. No odor or staining. 0 ppm.
80.71	20						4 1/4" HSA	11/18/92 8"/CCH	Probable sandy SILT as above with GRAVEL below 19'±.
78.71	22	SS 4	14 13 14 9	2	13	24			20' - 21'± Medium - dark brown, medium dense, sandy GRAVEL. Medium - very coarse grained, poorly sorted, rounded, predominately quartz sand. 70%± fine, rounded gravel 1/8" - 3/4". 10%± non plastic fines. Wet. No odor or staining. 0 ppm. 21' - 22' Medium orange and brown orange, medium dense gravelly SAND. Fine - occasionally very coarse grained, poorly sorted sand. 20% - 30% fine, rounded gravel 1/4" - 3/4". 10%± non plastic fines. Thin, dark red mottle at 21'. Dry. No odor or staining. Trace ppm.
75.71	25						4 1/4" HSA	8"/CCH	Probable sandy GRAVEL or gravelly SAND similar to above.
73.71	27	SS 5	10 16 31 21	2	10	24			Medium - dark brown, dense - very dense, sandy GRAVEL. Medium - very coarse grained, poorly sorted, rounded sand of quartz and rock fragments. 70%± subangular - rounded gravel 1/8" - 1"± of various rock types. Trace non plastic fines. Saturated. No odor or staining. 1 ppm.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

SSA = Solid Stem Auger
HSA = Hollow Stem Auger
FB = Finger Bit
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/18/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 5 INCLINATION V BEARING DATE START/FINISH 11/17/92 / 11/18/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 100.71 DEPTH TO WATER/DATE 24± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
70.71	30						4 1/4" HSA	8"/CCH	Sandy GRAVEL as above with probable SILT below 29'±.
68.71	32	SS 6	3 6 4 6	2	24	24			Medium - dark gray, loose - medium dense, sandy, inorganic SILT. Non plastic fines. 10%+ very fine grained sand. Saturated. No odor or staining. 0 ppm.
									No refusal to depth. Set 15' of 2", .010" slot, threaded, flush joint SCHD 40 PVC at 30'. Sand backfill to 13'. Bentonite seal 12' - 13'. Grouted in flush monitoring well box.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

HSA = Hollow Stem Auger
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER
SPRINGFIELD, VERMONT
DATE: 11/18/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 6 INCLINATION V BEARING DATE START/FINISH 11/18/92 / 11/18/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 99.71 DEPTH TO WATER/DATE 20± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
95.21	4.5						4" SSA	4 1/2"/FB	0" - 3" BITUMINOUS CONCRETE. 3" - 4'6" Light brown, loose silty SAND.
93.21	6.5	SS 1	3 1 2 2	2	17	24			Light brown, very loose - loose, silty SAND. Very fine - fine grained, well sorted sand. 40%± non plastic fines. Trace fine gravel. Trace mica and mafic minerals. Dry - slightly moist. No odor or staining. 0 ppm.
90.21	9.5						4 1/4" HSA	8"/CCH	Probable silty SAND similar to above.
88.21	11.5	SS 2	7 8 9 14	2	24	24			Medium brown and gray brown (grayer with depth), medium dense, silty SAND. Very fine - occasionally medium grained, moderately well sorted sand. 20% - 30% non plastic fines. Trace wood at top. Trace fine gravel to 1/4". Dry - slightly moist. No odor or staining. Trace ppm.
85.21	14.5						4 1/4" HSA	8"/CCH	Probable silty SAND as above becoming SILT.
83.21	16.5	SS 3	3 3 3 4	2	24	24			Medium - dark brown, loose, sandy, inorganic SILT. Non plastic fines. 10%± very fine grained sand. Trace mica. Moist. No odor or staining. 1 - 2 ppm.
80.21	19.5						4 1/4" HSA	8"/CCH	Probable SILT similar to above.
78.71	21	SS 4	9 11 10	2	18	18			19'6" - 20'6" Medium - dark brown SILT as above. Saturated. No odor or staining. 20'6" - 21' Medium - dark brown, medium dense, silty SAND. Fine - coarse grained, poorly sorted, rounded sand of quartz and rock fragments. 10%+ non plastic fines. Trace fine gravel to 1/4". Trace mica and mafic minerals. Saturated. Slight gasoline-like odor(?). 20 ppm.
75.21	24.5						4 1/4" HSA	8"/CCH	Probable SAND as above changing to GRAVEL at 23.5'
73.21	26.5	SS 5	15 9 7 7	2	18	24			24'6" - 25'10" Medium - dark gray, medium dense, sandy GRAVEL. Fine - very coarse grained, poorly sorted, rounded gravel of quartz, feldspar, and rock fragments. 70%± gravel 1/4" - 2". Trace non plastic fines. Saturated. Slight gasoline odor, no staining. 4 ppm. 25'10" - 26'6" Medium gray brown SILT. Non plastic fines. Saturated. No odor or staining. 0 ppm.
69.71	30						4 1/4" HSA	8"/CCH	Probable SILT similar to above.
67.71	32	SS 6	4 4 4 4	2	24	24			Medium - dark brown gray, loose, sandy, inorganic SILT. Non plastic fines. 10%+ very fine grained sand. Saturated. No odor or staining. 0 ppm.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

SSA = Solid Stem Auger
HSA = Hollow Stem Auger
FB = Finger Bit
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/18/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 6 INCLINATION V BEARING DATE START/FINISH 11/18/92 / 11/18/92

CASING ID CORE SIZE TOTAL DEPTH 32 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 99.71 DEPTH TO WATER/DATE 20± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
									No refusal to depth. Set 15' of 2", threaded, flush joint, SCHD 40 PVC at 30' (lower 5' is .010" slot, upper 10' is .020" slot). Sand backfill to 13'. Bentonite seal from 12' - 13'. Grouted in flush 10" monitoring well box.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/18/92 PROJECT: 462063

LOG OF BORING: MW 6

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 7 INCLINATION V BEARING DATE START/FINISH 11/23/92 / 11/23/92

CASING ID CORE SIZE TOTAL DEPTH 16 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 81.65 DEPTH TO WATER/DATE 2± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
79.65	2	SS 1	1 1 3 4	2	14	24			Medium brown gray, very loose - loose, sandy, SILT Non plastic fines. 10%+ very fine grained sand. Abundant medium brown lenses (1/4"±) and organic matter. Trace mica. damp. Slight organic odor, no staining. 0 ppm.
77.65	4	SS 2	3 2 2 2	2	24	24			2' - 2'9" Medium brown gray, very loose - loose sandy SILT with organic matter similar to above. 2'9" - 4' Medium - dark brown, very loose - loose SILT. Non plastic fines. Trace very fine grained sand, mica, and roots. Saturated. Slight organic odor, no staining. 0 ppm.
75.65	6	SS 3	1* 2 2	2	24	24	* 1/12"		Medium - dark brown, very loose SILT as above. Saturated. No odor or staining. 0 ppm.
73.65	8	SS 4	1 1 2 4	2	24	24			Medium gray brown, very loose - loose, slightly sandy SILT similar to above. Non plastic fines. 10%+ very fine grained sand. Abundant, gray, splotchey silt lenses. Trace mica. Saturated. Very slight odor(?), no staining. Trace ppm.
71.65	10	SS 5	6 10 11 12	2	13	24			8' - 8'6" Medium gray brown SILT similar to above but with 20% - 30% very fine grained sand. 8'6" - 9'9" Medium brown gray, medium dense SAND. Predominately medium - very coarse grained, poorly sorted sand of quartz and rock fragments. Trace non plastic fines. Trace fine gravel to 1/8" bottom 1/2"±. Saturated. No odor or staining. 0 ppm 9'9" - 10' Medium gray silty SAND.
69.65	12	SS 6	3 6 6 5	2	20	24			10' - 11'± Medium brown, loose - medium dense, SAND. Medium - very coarse grained, poorly sorted sand. Trace non plastic fines. Saturated. No odor or staining. 0 ppm. 11' - 12' Medium brown gray, medium dense, sandy GRAVEL. Medium - very coarse grained, poorly sorted, rounded sand of quartz and rock fragments. 60%+ rounded gravel 1/8' - 1/2". Saturated. Slight fuel oil-like odor, no staining. 2 ppm.
67.65	14	SS 7	4 5 5 11	2	9	24			Medium brown gray, loose - medium dense, sandy GRAVEL similar to above but coarser grained overall. Saturated. Slight - moderate fuel oil-like odor, very slight sheen on spoon. 2 ppm.
65.65	16	SS 8	9 5 4 8	2	7	24			14' - 14'6" Probable GRAVEL similar to above. 14'6" - 16' Medium gray, loose - medium dense, slightly sandy SILT. Non plastic fines. 10%± very fine grained sand. Trace mica. Saturated. No odor or staining. Trace ppm.
									No refusal to depth.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

ppm refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/23/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 7 INCLINATION V BEARING DATE START/FINISH 11/23/92 / 11/23/92

CASING ID CORE SIZE TOTAL DEPTH 16 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 81.65 DEPTH TO WATER/DATE 2± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
									Set 10' of 2", .020" slot, threaded, flush joint SCHD 40 PVC at 15'. Sand backfill to 4'. Bentonite seal 3' - 4'. Grouted in steel, stick-up protective casing.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/23/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 8 INCLINATION V BEARING DATE START/FINISH 11/23/92 / 11/24/92

CASING ID CORE SIZE TOTAL DEPTH 30 FT DRILLED BY: SOILS ENGINEERING, INC. (M.D.)

GROUND EL (AD) 89.06 DEPTH TO WATER/DATE 17± FT/ IMMED. LOGGED BY: B. COX

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
84.06	5						4" SSA	4 1/2"/FB	0' - 5' Medium brown and gray silty SAND and SILT Dry - moist. No odor or staining. 0 ppm.
82.06	7	SS 1	4 5 4 5	2	24	24			Medium gray, loose, slightly sandy, inorganic SILT Non plastic fines. 10%± very fine grained sand. Trace mica. Occasional small (1/8±) medium - dark gray clayey lenses. Dry - slightly moist. No odor or staining. 0 ppm.
79.06	10						4 1/4" HSA	8"/CCH	Probable SILT similar to above but gravelly from 8' - 9"+. 1"± wet spot at 7'±.
77.06	12	SS 2	23 10 13 14	2	9	24			WOOD and ORGANIC MATTER mixed with sandy SILT. Wood appears to have been burned. Dry - slightly moist. Foul organic odor. Trace ppm.
74.06	15						4 1/4" HSA	8"/CCH	As above(?).
72.06	17		2 4 4 4		0	24			No sample recovery, spoon wet.
70.06	19		4 3 3 4		1	24			1" of foul smelling SILT with organics. Saturated
69.06	20						4 1/4" HSA	8"/CCH	
67.06	22	SS 3	1 1*	2	9	24	* 1/18"		Medium - dark gray, very loose, silty SAND and ORGANIC MATTER. Very fine - fine grained, well sorted sand. 30%± non plastic fines. Abundant wood fragments. Saturated. Foul organic odor, no staining. 0 ppm.
65.06	24	SS 4	1 2 2 2	2	18	24			Medium brown gray, very loose, silty SAND. Very fine - medium grained, moderately well sorted sand 30%± non plastic fines. Trace mica. Saturated. Slight foul organic odor as above, no staining. 0 ppm.
64.06	25						4 1/4" HSA	8"/CCH	Probable SILT or SAND as above.
62.06	27	SS 5	2 18 24 14	2	9	24			25' - 26'9"± Medium - dark gray (occasionally dark brown), medium dense - dense, silty SAND. Predominately fine - medium grained, moderately well sorted sand. 20%+ non plastic fines. Saturated. No odor or staining. 0 ppm. 26'9" - 27' Medium brown GRAVEL.
			15 13						Medium gray, loose - medium dense, sandy GRAVEL. Medium - very coarse grained, poorly sorted,

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

SSA = Solid Stem Auger
HSA = Hollow Stem Auger
FB = Finger Bit
CCH = Conical Cutter Head
ppm Refers to HNU reading (10.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER

SPRINGFIELD, VERMONT

DATE: 11/24/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

BORING LOCATION MW 8 INCLINATION V BEARING DATE START/FINISH 11/23/92 / 11/24/92

CASING ID CORE SIZE TOTAL DEPTH 30 FT DRILLED BY:

GROUND EL (AD) 89.06 DEPTH TO WATER/DATE 17± FT/ IMMED. LOGGED BY:

ELEV AD FT	SAMPLE DEPTH FT	SAMPLE TYPE AND NO.	SAMPLE B	SAMP OD IN	LENGTH REC IN	LENGTH PENETRATION IN	REMARKS ON ADVANCE OF BORING	SIZE/TYPE BIT USED TO ADVANCE BORING	SOIL AND ROCK DESCRIPTION
60.06	29	SS 6	5 5	2	11	24			rounded sand of quartz and rock fragments. Trace non plastic fines. 60%+ rounded gravel 1/4" - 1". Saturated. Slight fuel oil odor(?), no staining. Trace ppm.
59.06	30						4 1/4" HSA	8"/CCH	
							11/24/92		No refusal to depth. No sample taken at 30' due to difficult flowing sand and gravel problems. Set 10' of 2", .020" slot, threaded, flush joint SCHD 40 PVC at 28'. Sand backfill to 16.7'. Bentonite seal 15.5' - 16.7'. Grouted in steel stick-up protective casing.

B - Penetration resistance, Blows/6" of a 140 lb hammer falling 30 in to drive a split spoon sampler.
REC - Length of sample recovered.
SS - Split spoon sample.
U - Undisturbed samples
S - Shelby tube N - Denison
F - Fixed piston P - Pitcher
O - Osterberg
SAMP OD - Outside diameter of sampling spoon

NOTES

HSA = Hollow Stem Auger
CCH = Conical Cutter Head
ppm Refers to HNU reading (0.2 eV lamp)

JOHNSON & DIX FUEL CORP
I-91 TRAVEL CENTER
SPRINGFIELD, VERMONT
DATE: 11/24/92 PROJECT: 462063

DH DUFRESNE-HENRY, INC.

APPENDIX E

DRILLERS BORING LOGS

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 1 OF 2

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT

PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT

REPORT SENT TO BRUCE COX PROJ. NO.

SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

DATE 11/16/92

HOLE NO. MW-1

LINE & STA.

OFFSET

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.

DATE STARTED 11/16/92

DATE COMPL. 11/16/92

BORING FOREMAN M.D. & R.H.

INSPECTOR B. COX

SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
								3"	ASPHALT PAVEMENT			
		2'6"- 4'6"	SS		7					1	24"	12"
				9	11							
		4'6"- 6'6"	SS	9	7					2	24"	16"
5'				4	6		DRY		MED. DENSE BROWN MED. FINE SAND TRACE OF GRAVEL (FILL)			
		6'6"- 8'6"	SS	9	9					3	24"	16"
				4	5							
		8'6"-10'6"	SS	7	7					4	24"	18"
				5	3							
		10'6"-12'6"	SS	3	6			9'6"		5	24"	12"
10'				6	4			10'6"	BROWN SILTY FINE SAND			
		12'6"-14'6"	SS	3	4				BROWN MED. FINE SAND - TRACES OF GRAVEL	6	24"	18"
				3	4							
				4				13'6"	ORIGINAL GROUND			
		15' -17'	SS	4	4				BROWN SILT - TRACE OF ROOTS	7	24"	18"
15'				4	4							
		17' -19'	SS	6	3		MOIST		LOOSE BROWN FINE SAND AND SILT	8	24"	24"
				4	5							
		19' -20'	SS	5	3					9	12"	12"
		20' -22'	SS	3	3					10	24"	18"
20'				3	5							
		22' -24'	SS	6	7			21'6"		11	24"	24"
				12	30				BROWN FINE SILTY SAND - STRONG			
		24' -25'	SS	30	17			23'	GAS ODOR	12	12'	12"
		25' -27'	SS	3	20					13	24"	13"
25'				14	12				GREY FINE SAND AND GRAVEL STRONG ODOR			
								28'		14	18"	18"
		28'6"-30'	SS		3							
				6	6			30'	GREYISH BROWN SILT - NO ODOR			
30'									INSTALLED 2" PVC MONITORING WELL AT 30' SLOTTED 10' - 30' WITH 0.020 SLOT FILTER SAND TO 8' BENTONITE SEAL 7' - 8' MATERIALS USED: 20' OF 2" PVC 0.020" SCREEN (CONTINUED ON PAGE 2 OF 2)			

GROUND SURFACE TO ..... USED ..... "CASING: THEN .....

140 lb. Wt. x 30"± fall on 2" O. D. Sampler

Sample Type

D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used

trace	0 to 10 %
little	10 to 20 %
some	20 to 35 %
and	35 to 50 %

Cohesionless Density

0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency

0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY

Earth Boring .....
Rock Coring .....
Samples .....

HOLE NO. MW-1

BRUNING 40-5020 70792

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 2 OF 2
DATE 11/16/92
HOLE NO. MW-1
LINE & STA.
OFFSET

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT
PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT
REPORT SENT TO BRUCE COX PROJ. NO.
SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

GROUND WATER OBSERVATIONS

At .... at .... Hours

(OBTAINED BY DUFRESNE-HENRY)

At .... at .... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 11/16/92
DATE COMPL. 11/16/92
BORING FOREMAN M.D. & R.H.
INSPECTOR B. COX
SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
									MATERIALS USED: CONTINUED			
									10' OF 2" PVC SOLID RISER			
									2 PVC SLIDE CAPS			
									1 10" MONITORING WELL MANHOLE COVER			
									450# OF SAND			
									25# OF BENTONITE PELLETS			
									40# OF CONCRETE MIX			

GROUND SURFACE TO 30' USED HSA "CASING: THEN

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used		
trace	0 to 10%	
little	10 to 20%	
some	20 to 35%	
and	35 to 50%	

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring 30'
Rock Coring
Samples 14

HOLE NO. MW-1

BORING 4...-...20 70/...

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 1 OF 2
DATE 11/16/92
HOLE NO. MW-2
LINE & STA.
OFFSET

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT
PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT
REPORT SENT TO BRUCE COX PROJ. NO.
SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 11/16/92
DATE COMPL. 11/16/92
BORING FOREMAN M.D. & R.H.
INSPECTOR B. COX
SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
							DRY		MED. DENSE BROWN FINE SAND AND SILT	1	24"	18"
		0' - 2'	SS	5	7							
				6	6							
5'		5' - 7'	SS	4	9				BROWN FINE SAND - TRACE OF SILT - TRACE OF GRAVEL	2	24"	24"
				7	6							
										3	24"	12"
10'		10' - 12'	SS	7	6			10'6"	ORIGINAL GROUND			
				6	4				MED. DENSE GREY FINE SANDY SILT - TRACES OF ROOTS - SLIGHT ODOR			
										4	24"	24"
15'		15' - 17'	SS	2	3		MOIST TO WET		LOOSE BROWN SILT - SLIGHT ODOR			
				4	7							
										5	24"	12"
20'		20' - 22'	SS	11	36			20'				
				23	34				GREY MED. FINE SAND AND GRAVEL - STRONG ODOR AND SHEEN			
										6	24"	12"
25'		25' - 27'	SS	11	9			26'				
				7	7				OLIVE BROWN SILT			
										7	24"	18"
30'		30' - 32'	SS	2	2			32'				
				4	5				INSTALLED 2" PVC MONITORING WELL AT 30'6" SLOTTED 10'6" - 30'6" WITH 0.020" SLOT FILTER SAND TO 8' BENTONITE SEAL 7' - 8'			
35'									(CONTINUED ON PAGE 2 OF 2)			

GROUND SURFACE TO ..... USED ..... "CASING: THEN .....

140 lb. Wt. x 30"± fall on 2" O. D. Sampler

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft 30 + Hard
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff

SUMMARY
Earth Boring .....
Rock Coring .....
Samples .....

HOLE NO. MW-2

Bhumig 40-3020 707sc

Soils Engineering Inc.
Main St. Charlestown, N. H. 03603

SHEET 2 OF 2
DATE 11/16/92
HOLE NO. MW-2
LINE & STA.
OFFSET

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT
PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT
REPORT SENT TO BRUCE COX PROJ. NO.
SAMPLE SENT TO RETAINED BY DUFRESNE HENRY OUR JOB NO. 5584-92

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.
At .... at .... Hours	Type	HSA	SS	
(OBTAINED BY DUFRESNE-HENRY)	Size I. D.	4 1/4"	1 1/2"	
At .... at .... Hours	Hammer Wt.		140#	BIT
	Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 11/16/92
DATE COMPL. 11/16/92
BORING FOREMAN M.D. & R.H.
INSPECTOR B. COX
SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
									MATERIALS USED:			
									20' OF 2" PVC 0.020" SCREEN			
									10' OF 2" PVC SOLID RISER			
									2 PVC SLIDE CAPS			
									1 10" MONITORING WELL MANHOLE COVER			
									400# OF SAND			
									25# OF BENTONITE			
									65# OF CONCRETE MIX			

GROUND SURFACE TO 32' USED HSA "CASING: THEN DROVE SS 24"
140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4 Soft	30 + Hard
4-8 M/Stiff	
8-15 Stiff	
15-30 V-Stiff	

SUMMARY
Earth Boring 32'
Rock Coring
Samples 7

HOLE NO. MW-2

BORING 40-5020 70/92

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 1 OF 2

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT

PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT

REPORT SENT TO BRUCE COX PROJ. NO.

SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

DATE 11/17/92

HOLE NO. MW-3

LINE & STA.

OFFSET

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.

DATE STARTED 11/17/92

DATE COMPL. 11/17/92

BORING FOREMAN M.D. & R.H.

INSPECTOR B. COX

SOILS ENGR.

LOCATION OF BORING: NORTH END OF TANKS

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From		To	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
				0-6	6-12	12-18						
								2 1/2"	PAVEMENT			
		0'6"- 2'6"	SS	9	10			1'	MED. DENSE BROWN SANDY GRAVELS	1	24"	6"
				12	13							
5'		5' - 7'	SS	12	15				LOOSE TO MED. DENSE LIGHT BROWN SILTY FINE SANDS - TRACE OF COBBLES (FILL)	2	24"	20"
				17	16							
		10' - 12'	SS	3	5			10'4"	OLD GROUND	3	24"	24"
10'				4	5							
		15' - 17'	SS	5	5	5			MED. DENSE BROWN SANDY SILTS	4	24"	24"
15'				5								
		20' - 22'	SS	2	4				(WATER AT 19' - 20' DEPTH)	5	24"	24"
20'				6	15			21'6"				
							WET	23'	MED. DENSE BROWN MED. TO COARSE SANDS			
		25' - 27'	SS	11	8		WET		MED. DENSE BROWN SANDY GRAVELS AND SANDS - LAYERED	6	24"	14"
25'				6	11			26'				
									MED. DENSE GREY SANDY SILTS	7	24"	24"
		30' - 32'	SS	3	8							
30'				10	9			32'				
									INSTALLED 2" PVC MONITORING WELL BOTTOM OF WELL AT 30'6" TOP OF WELL AT 15'6" FILTER SAND FROM 13' - 30'6" BENTONITE SEAL FROM 12' - 13' MATERIALS USED: (CONTINUED ON PAGE 2 OF 2)			
35'												

GROUND SURFACE TO ..... USED ..... "CASING; THEN .....

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type

D—Dry C—Cored W—Washed

UP—Undisturbed Piston

TR—Test Pit A—Auger V—Vane Test

UT—Undisturbed Thinwall

Proportions Used		
trace	0 to 10%	
little	10 to 20%	
some	20 to 35%	
and	35 to 50%	

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY

Earth Boring .....

Rock Coring .....

Samples .....

HOLE NO. MW-3

BRUNING 40-5020 70792

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 2 OF 2
DATE 11/17/92
HOLE NO. MW-3
LINE & STA.
OFFSET

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT
PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT
REPORT SENT TO BRUCE COX PROJ. NO.
SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 11/17/92
DATE COMPL. 11/17/92
BORING FOREMAN M.D. & R.H.
INSPECTOR B. COX
SOILS ENGR.

LOCATION OF BORING: NORTH END OF TANKS

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
									MATERIALS USED: CONTINUED			
									15' OF 2" PVC 0.020" SCREEN			
									15' OF 2" PVC SOLID PIPE			
									2 PVC SLIDE CAPS			
									1 10" MONITORING WELL MANHOLE COVER			
									400# OF SAND			
									25# OF BENTONITE PELLETS			
									65# OF CONCRETE MIX			

GROUND SURFACE TO 32' USED HSA "CASING: THEN DROVE SS 24"

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring 32'
Rock Coring
Samples 7

HOLE NO. MW-3

BRUNING 40-5020 70792

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 1 OF 2
DATE 11/17/92
HOLE NO. MW-4
LINE & STA.
OFFSET

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT
PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT
REPORT SENT TO BRUCE COX PROJ. NO.
SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 11/17/92
DATE COMPL. 11/17/92
BORING FOREMAN M.D. & R.H.
INSPECTOR B. COX
SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
								1 3/4"	PAVEMENT			
								1'2"	MED. DENSE BROWN GRAVELLY FINE SANDS			
5'		5' - 7'	SS	4	14					1	24"	24"
				20	37							
									MED. DENSE TO DENSE LIGHT BROWN SILTY FINE SANDS			
10'		10' - 12'	SS	2	3					2	24"	24"
				5	6							
								11'8"	OLD GROUND			
15'		15' - 17'	SS	4	3				LOOSE BROWN SANDY SILTS	3	24"	24"
				3	4							
								19'6"		4	24"	23"
20'		20' - 22'	SS	18	26							
				14	10							
							WET		(WATER AT 22'+/-)			
								24'	MED. DENSE BROWN SANDY FINE TO COARSE GRAVELS - STRONG ODOR			
25'		25' - 27'	SS	4	5					5	24"	24"
				6	9							
							WET		MED. DENSE GREY MED. TO COARSE SANDS - STRONG ODOR			
30'		30' - 32'	SS	19	9					6	24"	24"
				8	11							
								32'				
35'									SCREEN FROM 15' - 30' FILTER SAND FROM 12'2" - 30' BENTONITE SEAL FROM 11' - 12'2" MATERIALS USED: 15' OF 2" PVC 0.020" SCREEN 15' OF 2" PVC SOLID RISER			

(CONTINUED ON PAGE 2 OF 2)

GROUND SURFACE TO ..... USED ..... "CASING: THEN .....

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring .....
Rock Coring .....
Samples .....

HOLE NO. MW-4

BRUNING 40-5020 70792

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 2 OF 2
DATE 11/17/92
HOLE NO. MM-4
LINE & STA.
OFFSET

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT
PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT
REPORT SENT TO BRUCE COX PROJ. NO.
SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 11/17/92
DATE COMPL. 11/17/92
BORING FOREMAN M.D. & R.H.
INSPECTOR B. COX
SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
									MATERIALS USED: CONTINUED			
									2 PVC SLIDE CAPS			
									1 10" MONITORING WELL MANHOLE COVER			
									300# OF SILICA SANDS			
									25# OF BENTONITE PELLETS			
									40# OF CONCRETE MIX			

GROUND SURFACE TO 32' USED HSA "CASING: THEN DROVE SS 24"
140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used		
trace	0 to 10 %	
little	10 to 20 %	
some	20 to 35 %	
and	35 to 50 %	

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring 32'
Rock Coring
Samples 6

HOLE NO. MM-4

BRUNING 40-5020 7/92

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 1 OF 2

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT

PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT

REPORT SENT TO BRUCE COX PROJ. NO.

SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

DATE 11/17/92

HOLE NO. MW-5

LINE & STA.

OFFSET

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.

DATE STARTED 11/17/92

DATE COMPL. 11/18/92

BORING FOREMAN M.D. & R.H.

INSPECTOR B. COX

SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
								3"	ASPHALT PAVEMENT			
5'		5' - 7'	SS	19	27		DRY		DENSE BROWN SILTY FINE SAND - TRACE OF GRAVEL	1	24"	24"
				21	25							
10'		10' - 12'	SS	8	14				BROWN SILTY FINE SAND	2	24"	24"
				23	22							
15'		15' - 17'	SS	6	5		MOIST		MED. DENSE DARK BROWN SILTY FINE SAND	3	24"	18"
				5	5							
20'		20' - 22'	SS	14	13			20'		4	24"	12"
				15	8		DRY		DENSE BROWN MED. FINE SAND AND FINE GRAVEL			
25'		25' - 27'	SS	10	15		WET		DENSE SAME MATERIAL	5	24"	12"
				32	20			28'				
30'		30' - 32'	SS	3	6		WET		MED. DENSE GREY SILT	6	24"	24"
				4	6			32'				
35'									INSTALLED 2" PVC MONITORING WELL AT 30' SLOTTED FROM 15' - 30' WITH 0.010" FILTER SAND TO 13' BENTONITE PELLETS FROM 12' - 13' MATERIALS USED:			
									(CONTINUED ON PAGE 2 OF 2)			

GROUND SURFACE TO ..... USED ..... "CASING: THEN .....

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type

D—Dry C—Cored W—Washed

UP—Undisturbed Piston

TP—Test Pit A—Auger V—Vane Test

UT—Undisturbed Thinwall

Proportions Used			
trace	0	to	10%
little	10	to	20%
some	20	to	35%
and	35	to	50%

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY

Earth Boring .....

Rock Coring .....

Samples .....

HOLE NO. MW-5

BRUNING 40-5020 70792

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 2 OF 2
DATE 11/17/92
HOLE NO. MW-5
LINE & STA.
OFFSET

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT
PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT
REPORT SENT TO BRUCE COX PROJ. NO.
SAMPLE SENT TO RETAINED BY S.E.I. OUR JOB NO. 5584-92

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 11/17/92
DATE COMPL. 11/18/92
BORING FOREMAN M.D. & R.H.
INSPECTOR B. COX
SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
									MATERIALS USED: CONTINUED 15' OF 2" PVC 0.010" SCREEN 15' OF 2" PVC SOLID RISER 2 PVC SLIDE CAPS 1 10" MONITORING WELL MANHOLE COVER 375# OF SAND 25# OF BENTONITE PELLETS			

GROUND SURFACE TO 32' USED HSA "CASING: THEN DROVE SS 24"
140 lb. Wt. x 30"± fall on 2" O. D. Sampler

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft 30 + Hard
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff

SUMMARY
Earth Boring 32'
Rock Coring
Samples 6

HOLE NO. MW-5

BRUNING 40-5020 10/92

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 1 OF 2
DATE 11/18/92
HOLE NO. MW-6
LINE & STA.
OFFSET

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT
PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT
REPORT SENT TO BRUCE COX PROJ. NO.
SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.
DATE STARTED 11/18/92
DATE COMPL. 11/18/92
BORING FOREMAN M.D. & R.H.
INSPECTOR B. COX
SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
								3"	ASPHALT PAVEMENT			
5'		5' - 7'	SS	3	1		DRY		LOOSE BROWN SILTY FINE SAND - TRACE OF GRAVEL (FILL)	1	24"	24"
				2	2							
10'		10' - 12'	SS	7	7				BROWN SILTY FINE SAND - LITTLE GRAVEL - TRACE OF WOOD (FILL)	2	24"	24"
				10	15			14'				
15'		15' - 17'	SS	3	3		MOIST		LOOSE BROWN FINE SANDY SILT	3	24"	24"
				3	4							
20'		20' - 21'6"	SS	9	11					4	18"	18"
				10					LAYERS OF BROWN SILT AND FINE SANDY SILT - SLIGHT ODOR			
								20'				
							WET		MED. DENSE GREY MED. FINE SAND AND GRAVEL WITH COBBLES - SLIGHT ODOR	5	24"	18"
25'		25' - 27'	SS	15	9			26'				
				7	7							
							WET		LOOSE GREY SILT			
30'		30' - 32'	SS	4	4					6	24"	24"
				4	4							
								32'				
35'									INSTALLED 2" PVC MONITORING WELL AT 29'6" SLOTTED FROM 14'6" - 29'6" WITH 0.020" FILTER SAND TO 13' BENTONITE SEAL FROM 12' - 13' (CONTINUED ON PAGE 2 OF 2)			

GROUND SURFACE TO ..... USED ..... "CASING: THEN .....

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used			
trace	0	to	10%
little	10	to	20%
some	20	to	35%
and	35	to	50%

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring .....
Rock Coring .....
Samples .....

HOLE NO. MW-6

BKUNING 40-5020 7079Z

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

TO: DUFRESNE-HENRY ENGINEERING
ADDRESS: NORTH SPRINGFIELD, VT
PROJECT NAME: TRAVEL CENTER
LOCATION: SPRINGFIELD, VT
REPORT SENT TO: BRUCE COX
PROJ. NO.:
SAMPLE SENT TO: RETAINED BY DUFRESNE-HENRY
OUR JOB NO.: 5584-92

SHEET 2 OF 2
DATE: 11/18/92
HOLE NO.: MW-6
LINE & STA.:
OFFSET:

GROUND WATER OBSERVATIONS

At .... at .... Hours

(OBTAINED BY DUFRESNE-HENRY)

At .... at .... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.:
DATE STARTED: 11/18/92
DATE COMPL.: 11/18/92
BORING FOREMAN: M.D. & R.H.
INSPECTOR: B. COX
SOILS ENGR.:

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
									MATERIALS USED:			
									15' OF 2" PVC 0.020" SCREEN			
									15' OF 2" PVC SOLID RISER			
									2 PVC SLIDE CAPS			
									1 10" MONITORING WELL MANHOLE COVER			
									350# OF SAND			
									25# OF BENTONITE PELLETS			
									80# OF CONCRETE MIX			

GROUND SURFACE TO 32' USED HSA "CASING: THEN DROVE SS 24"

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type
D—Dry C—Cored W—Washed
UP—Undisturbed Piston
TP—Test Pit A—Auger V—Vane Test
UT—Undisturbed Thinwall

Proportions Used			
trace	0	to	10%
little	10	to	20%
some	20	to	35%
and	35	to	50%

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency		
0-4	Soft	30 + Hard
4-8	M/Stiff	
8-15	Stiff	
15-30	V-Stiff	

SUMMARY
Earth Boring: 32'
Rock Coring:
Samples: 6

HOLE NO. MW-6

BORING 40-5020 70792

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 1 OF 1

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT

PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT

REPORT SENT TO BRUCE COX PROJ. NO.

SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

DATE 11/23/92

HOLE NO. MW-7

LINE & STA.

OFFSET

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.

DATE STARTED 11/23/92

DATE COMPL. 11/23/92

BORING FOREMAN M.D. & R.H.

INSPECTOR B. COX

SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
		0' - 2'	SS	1	1		MOIST		LOOSE BROWN SILT	1	24"	18"
				3	4		VERY					
		2' - 4'	SS	3	2		MOIST		SAME MATERIAL	2	24"	24"
				2	2							
5'		4' - 6'		1	1		WET		SAME MATERIAL	3	24"	24"
				1	1							
		6' - 8'	SS	1	1			7'		4	24"	24"
				2	4		WET	8'	LOOSE BROWN FINE SANDY SILT			
		8' - 10'	SS	6	10			9'	BROWN SILT AND FINE SAND	5	24"	13"
10'				11	12		WET		MED. DENSE GREY BROWN GRAVELLY MED. FINE SAND	6	24"	18"
		10' - 12'	SS	3	6							
				6	5					7	24"	18"
		12' - 14'	SS	4	5				GREY BROWN MED. COARSE SAND AND			
				5	11			14'	GRAVEL			
15'		14' - 16'	SS	9	5					8	24"	8"
				4	8			16'	OLIVE GREY FINE SANDY SILT			
									INSTALLED 2" PVC MONITORING WELL AT 15'			
									SLOTTED FROM 5' - 15' WITH 0.020"			
									FILTER SAND TO 4'			
									BENTONITE SEAL FROM 3' - 4'			
20'									MATERIALS USED:			
									10' OF 2" PVC 0.020" SCREEN			
									7' OF 2" PVC SOLID			
									25# OF BENTONITE			
									225# OF SAND			
									40# OF CEMENT MIX			
									2 PVC SLIDE CAPS			
									1 LOCK			
									1 PROTECTIVE STEEL CASING			

GROUND SURFACE TO 16' USED HSA "CASING: THEN DROVE SS 24"

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type

D—Dry C—Cored W—Washed

UP—Undisturbed Piston

TP—Test Pit A—Auger V—Vane Test

UT—Undisturbed Thinwall

Proportions Used			
trace	0	to	10%
little	10	to	20%
some	20	to	35%
and	35	to	50%

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY

Earth Boring 16'

Rock Coring

Samples 8

HOLE NO. MW-7

BRUNING 40-5020 70792

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 1 OF 2

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT

PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT

REPORT SENT TO BRUCE COX PROJ. NO.

SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

DATE 11/23/92

HOLE NO. MW-8

LINE & STA.

OFFSET

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.

DATE STARTED 11/23/92

DATE COMPL. 11/23/92

BORING FOREMAN M.D. & R.H.

INSPECTOR B. COX

SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
5'		5' - 7'	SS	4	5				LIGHT GREY FINE SANDY SILT	1	24"	24"
				4	5							
10'		10' - 12'	SS	23	10				WOOD	2	24"	9"
				13	14							
15'		15' - 17'	SS	3	4					3	24"	0"
				4	4							
		17' - 19'	SS	4	3					4	24"	0"
				3	4							
20'		20' - 22'	SS	1	1	18			GREY SILTY FINE SAND - TRACE OF GRAVEL	5	24"	12"
		22' - 24'	SS	1	2					6	24"	16"
				2	2							
25'		25' - 27'	SS	2	18					7	24"	12"
				24	14			25'6"				
		27' - 29'	SS	15	13				GREY MED. COARSE SAND AND GRAVEL	8	24"	12"
				5	5							
30'								30'				

INSTALLED 2" PVC MONITORING WELL AT 28'

SLOTTED FROM 18' - 28' WITH 0.020" FILTER SAND TO 16'

BENTONITE SEAL FROM 15' - 16'

MATERIALS USED:

10' OF 2" PVC 0.020" SCREEN

20' OF 2" PVC SOLID

(CONTINUED ON PAGE 2 OF 2)

GROUND SURFACE TO ..... USED ..... "CASING: THEN .....

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type

D—Dry C—Cored W—Washed

UP—Undisturbed Piston

TP—Test Pit A—Auger V—Vane Test

UT—Undisturbed Thinwall

Proportions Used			
trace	0	to	10%
little	10	to	20%
some	20	to	35%
and	35	to	50%

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY

Earth Boring .....

Rock Coring .....

Samples .....

HOLE NO. MW-8

BKUNING 40-5020 70/92

Soils Engineering Inc.

Main St. Charlestown, N. H. 03603

SHEET 2 OF 2

TO DUFRESNE-HENRY ENGINEERING ADDRESS NORTH SPRINGFIELD, VT

PROJECT NAME TRAVEL CENTER LOCATION SPRINGFIELD, VT

REPORT SENT TO BRUCE COX PROJ. NO.

SAMPLE SENT TO RETAINED BY DUFRESNE-HENRY OUR JOB NO. 5584-92

DATE 11/23/92

HOLE NO. MW-8

LINE & STA.

OFFSET

GROUND WATER OBSERVATIONS

At ..... at ..... Hours

(OBTAINED BY DUFRESNE-HENRY)

At ..... at ..... Hours

	CASING	SAMPLER	CORE BAR.
Type	HSA	SS	
Size I. D.	4 1/4"	1 1/2"	
Hammer Wt.		140#	BIT
Hammer Fall		30"	

SURFACE ELEV.

DATE STARTED 11/23/92

DATE COMPL. 11/23/92

BORING FOREMAN M.D. & R.H.

INSPECTOR B. COX

SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From — To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No.	Pen	Rec.
									MATERIALS USED: CONTINUED 25# OF BENTONITE 250# OF SAND 40# OF CEMENT MIX 2 PVC SLIDE CAPS 1 LOCK 1 PROTECTIVE STEEL CASING			

GROUND SURFACE TO 30' USED HSA "CASING: THEN

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Sample Type

D—Dry C—Cored W—Washed

UP—Undisturbed Piston

TP—Test Pit A—Auger V—Vane Test

UT—Undisturbed Thinwall

Proportions Used

trace	0	to	10%
little	10	to	20%
some	20	to	35%
and	35	to	50%

Cohesionless Density

0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency

0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY

Earth Boring 30'

Rock Coring

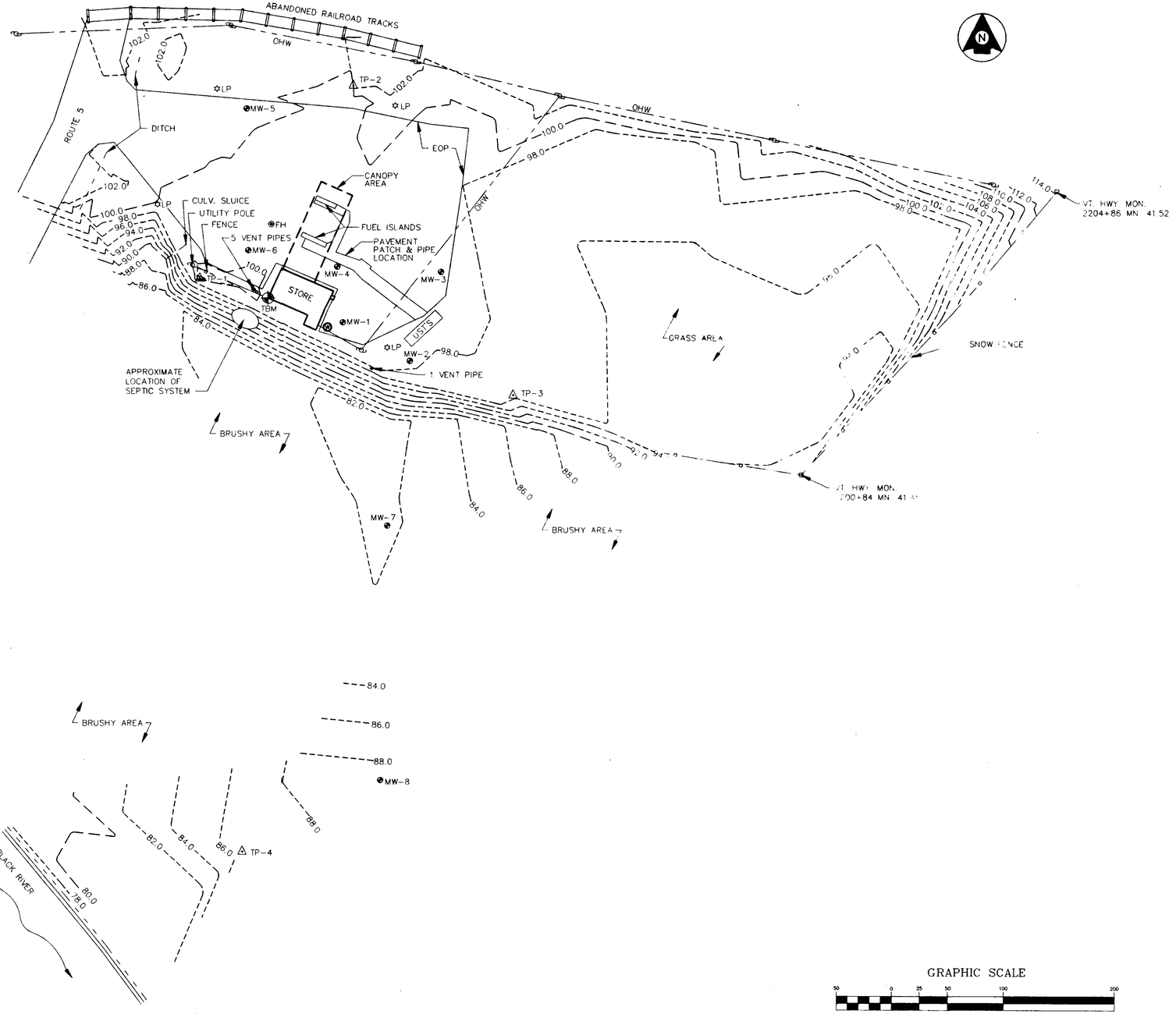
Samples 8

HOLE NO. MW-8

BRUNING 40-5020 7/79?

APPENDIX F

SITE PLAN



LEGEND

- BUILDING
- CANOPY AREA
- EDGE OF PAVEMENT
- RAILROAD TRACKS
- OVERHEAD POWER LINES
- SNOW FENCE
- 10 FOOT CONTOUR
- 2 FOOT CONTOUR
- TBM — TEMPORARY BENCH MARK AT CORNER OF BUILDING, TOP OF CONCRETE, ASSUMED EL. 100.0
- TP-1 — TRAVERSE POINT
- MW-1 — MONITORING WELL
- DRILLED WATER WELL
- FH — FUEL FILL HOLE
- VP — VENT PIPE
- UTILITY POLE
- LP — LIGHT POLE
- VERMONT HIGHWAY MONUMENT

NOTE

THE INFORMATION ON THIS DRAWING IS BASED ON A SURVEY BY COLEMAN SURVEYS AND DUFRESNE-HENRY DATED DECEMBER 2, 1992.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

Rev.	Description	By	Date

JOHNSON & DIX FUEL CO.
SPRINGFIELD TRAVEL CENTER
SITE PLAN

SPRINGFIELD, VERMONT

Dufresne-Henry Inc.
Precision Park
No. Springfield,
Vermont 05150

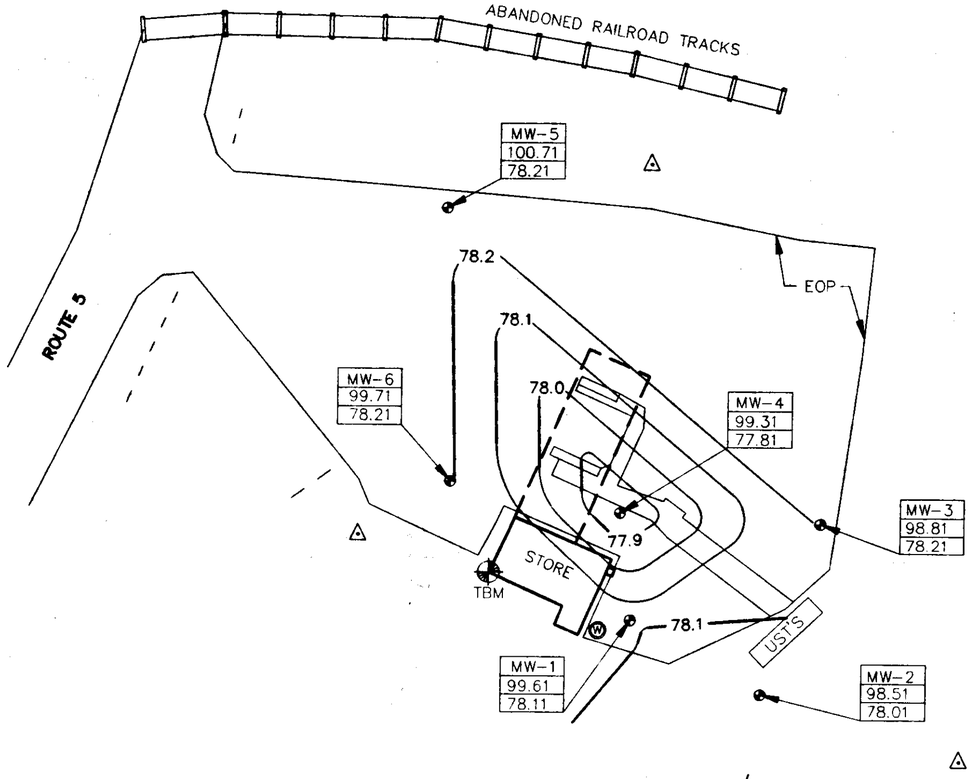
Client No.	462063
Proj. Manager	F.D. DEANE
Proj. Designer	C.L. GATES
Drawn By	C.L. GATES
Checked By	F.D.D. / P.B.A.
Scale	1"=50'
Approved	
Date	DECEMBER 1992

Sheet 1 of 4

D

APPENDIX G

GROUNDWATER PLAN



LEGEND

- BUILDING
- CANOPY AREA
- EDGE OF PAVEMENT
- RAILROAD TRACKS
- SNOW FENCE
- TEMPORARY BENCH MARK AT CORNER OF BUILDING, TOP OF CONCRETE, ASSUMED EL. 100.0
- TRAVERSE POINT
- MONITORING WELL
- DRILLED WATER WELL

MW-2 / 98.51 / 78.01 — MONITORING WELL NUMBER; SURFACE ELEVATION (ASSUMED DATUM); GROUNDWATER ELEVATION (12/17/92)

MW-8 / 91.56** / 77.96 — MONITORING WELL NUMBER; TOP OF PVC ELEVATION (ASSUMED DATUM); GROUNDWATER ELEVATION (12/17/92)

NOTE:

THE GROUNDWATER COUNTOURS ON THIS DRAWING ARE BASED ON FIELD WORK PERFORMED ON DECEMBER 30, 1992.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

Client No.	462063
Proj.Mgr.	F.D.D.
Date	12/92

JOHNSON & DIX FUEL CO.
SPRINGFIELD TRAVEL CENTER
GROUNDWATER PLAN
SPRINGFIELD, VERMONT

Dufresne-Henry
Precision Park No. Springfield, Vermont 05150 Inc.

A

APPENDIX H

TRAVEL CENTER WELL ANALYSIS RESULTS

Eastern Analytical, Inc. 130 Hall St., Concord, NH 03301 (603) 228-0525

December 2, 1992

Ted Reeves
Dufresne-Henry
Precision Park
North Springfield, VT 05150

Subject: Laboratory Report

Eastern Analytical, Inc. ID #:	4991 DUF
Client Identification:	462063/Travel Center
Sample Quantity/Type:	1 aqueous
Date Received:	November 18, 1992

Dear Mr. Reeves:

Enclosed, please find the 1 page laboratory report for the above identified project. All analyses were subjected to rigorous quality control measures to assure data accuracy.

The following standard abbreviations and conventions apply throughout all Eastern Analytical, Inc. reports:

- < = "Less than" followed by the detection limit
- TNR = Testing Not Requested
- ND = None detected, no established detection limits

If you have any questions regarding the results contained within, please feel free to directly contact me, the department supervisor, or the analytical chemist who performed the testing in question.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

William Brunkhorst
Lab Director

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 4991 DUF

Client: Dufresne-Henry
Client Designation: **462063/Travel Center**

Sample Qty/Type: 1 aqueous
Date Received: November 18, 1992

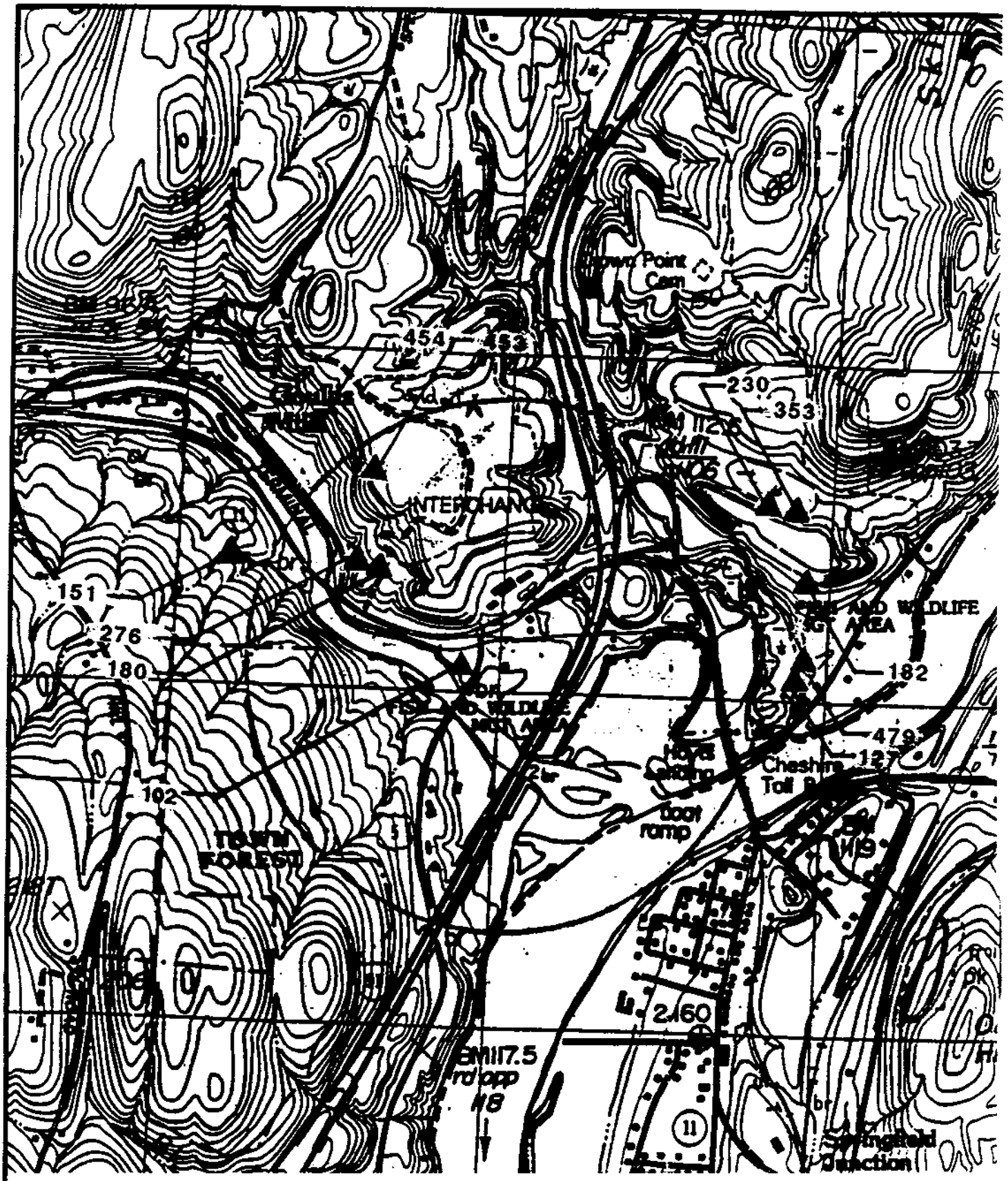
Hazardous Substance List Volatile Organic Compounds

Sample ID:	L-1	
Matrix:	Aqueous	
Date of Analysis:	11/24/92	
Units:	µg/L	EPA
Analyst:	NZ	Method
Benzene	< 1	602
Toluene	< 1	602
Ethylbenzene	< 1	602
Total Xylenes	< 1	602
MTBE	< 20	8015

Approved By: Timothy Schaper, Organics Supervisor Timothy D. Schaper

APPENDIX I

RECEPTOR PLAN AND WELLS WITHIN 1/2 MILE RADIUS



RECEPTOR PLAN

KNOWN WELL LOCATIONS WITHIN 1/2 MILE OF SITE

APPROXIMATE SCALE 1:18000 TAKEN FROM USGS QUAD SHEET FOR SPRINGFIELD, VT

Client No.	462063	JOHNSON & DIX FUEL CORP.
Proj. Mgr.	F.D.D.	I-91 EXIT 7 TRAVEL CENTER
Date	01/93	PETROLEUM CONTAMINATION INVESTIGATION
		SPRINGFIELD, VERMONT

Dufresne-Henry Inc.

A

BRUNING 44-232 45337-13

EXIT 7 TRAVEL CENTER – SPRINGFIELD, VERMONT

WELL LOCATIONS WITHIN 1/2 MILE OF SITE

WELL #	NAME OF WELL OWNER	MAP LOCATION	YIELD (gpm)	TOTAL DEPTH (ft.)	DEPTH TO ROCK (ft.)	CASING LENGTH (ft.)	STATIC WATER LEVEL (ft.)	YEAR DRILLED	DRILLER NUMBER
102	Kenneth Manning – MOBIL Station	47B6	10	120	14	22	-----	1971	53
127	James Craig	47B6	6	225	76	93	-----	1973	118
151	Ed Foster	47B6	7	243	15	22	100	1974	26
160	Eureka School Info Center	47B6	6	243	90	96	-----	1976	26
162	Mrs. Helen Granel	47B6	1.25	400	50	60	120	1977	112
230	Harold Greenwood	47B6	1	150	6	14	20	1979	164
276	Jessie Watkins	47B6	20	84	3	10	14.5	1981	15
353	Weston Marshall	47B6	0.75	480	52	63	80	1984	112
453	Town of Springfield, VT	47B6	-----	19	19	-----	2	1989	-----
454	Town of Springfield, VT	47B6	-----	17	17	-----	-----	1989	-----
479	Ray Stocker, Jr.	47B6	0.75	300	30	51	25	1991	16

APPENDIX J

GROUNDWATER ANALYSIS RESULTS

EXIT 7 TRAVEL CENTER – SPRINGFIELD, VERMONT

COMPARISON BETWEEN DECEMBER 1, '92, DECEMBER 17, '92, and DECEMBER 30, '92.

B:\DISPRCOM.WK1

Location	Water Elevation			Benzene ug/l			Ethylbenzene ug/l			Toluene ug/l		
	DEC. 1, '92	DEC. 17, '92	DEC. 30, '92	DEC. 1, '92	DEC. 17, '92	DEC. 30, '92	DEC. 1, '92	DEC. 17, '92	DEC. 30, '92	DEC. 1, '92	DEC. 17, '92	DEC. 30, '92
MW-1	78.1	78.1	78.1	610	DEPTH ONLY	DEPTH ONLY	<10	DEPTH ONLY	DEPTH ONLY	130	DEPTH ONLY	DEPTH ONLY
MW-2	FREE PRODUCT	78.1	78.0	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY
MW-3	79.0	78.3	78.2	20	DEPTH ONLY	DEPTH ONLY	<1	DEPTH ONLY	DEPTH ONLY	1	DEPTH ONLY	DEPTH ONLY
MW-4	FREE PRODUCT	77.8	77.8	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY
MW-5	79.2	78.2	78.2	<1	DEPTH ONLY	DEPTH ONLY	<1	DEPTH ONLY	DEPTH ONLY	<1	DEPTH ONLY	DEPTH ONLY
MW-6	79.1	78.2	78.2	130	DEPTH ONLY	DEPTH ONLY	<1	DEPTH ONLY	DEPTH ONLY	3	DEPTH ONLY	DEPTH ONLY
MW-7	78.7	78.1	78.0	190	DEPTH ONLY	DEPTH ONLY	19	DEPTH ONLY	DEPTH ONLY	13	DEPTH ONLY	DEPTH ONLY
MW-8	78.1	78.1	78.0	<1	DEPTH ONLY	DEPTH ONLY	<1	DEPTH ONLY	DEPTH ONLY	<1	DEPTH ONLY	DEPTH ONLY

EXIT 7 TRAVEL CENTER – SPRINGFIELD, VERMONT

COMPARISON BETWEEN DEC. 1, '92, DEC. 17, '92, and DEC. 30, '92.

Location	Xylenes ug/l			Total BTEX ug/l			HNU Reading ppm		
	DEC. 1, '92	DEC. 17, '92	DEC. 30, '92	DEC. 1, '92	DEC. 17, '92	DEC. 30, '92	DEC. 1, '92	DEC. 17, '92	DEC. 30, '92
MW-1	260	DEPTH ONLY	DEPTH ONLY	1,000	DEPTH ONLY	DEPTH ONLY	------	DEPTH ONLY	DEPTH ONLY
MW-2	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY	150	DEPTH ONLY	DEPTH ONLY
MW-3	2	DEPTH ONLY	DEPTH ONLY	23	DEPTH ONLY	DEPTH ONLY	60	DEPTH ONLY	DEPTH ONLY
MW-4	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY	FREE PRODUCT	DEPTH ONLY	DEPTH ONLY	100	DEPTH ONLY	DEPTH ONLY
MW-5	<1	DEPTH ONLY	DEPTH ONLY	0	DEPTH ONLY	DEPTH ONLY	------	DEPTH ONLY	DEPTH ONLY
MW-6	15	DEPTH ONLY	DEPTH ONLY	148	DEPTH ONLY	DEPTH ONLY	7	DEPTH ONLY	DEPTH ONLY
MW-7	28	DEPTH ONLY	DEPTH ONLY	250	DEPTH ONLY	DEPTH ONLY	<1	DEPTH ONLY	DEPTH ONLY
MW-8	<1	DEPTH ONLY	DEPTH ONLY	0	DEPTH ONLY	DEPTH ONLY	------	DEPTH ONLY	DEPTH ONLY

Eastern Analytical, Inc. 130 Hall St., Concord, NH 03301 (603) 228-0525

December 11, 1992

Peter Aldrich
Dufresne-Henry
Precision Park
North Springfield, VT 05150

Subject: Laboratory Report

Eastern Analytical, Inc. ID #:	5072 DUF
Client Identification:	462063/Travel Center
Sample Quantity/Type:	6 aqueous
Date Received:	December 2, 1992

Dear Mr. Aldrich:

Enclosed, please find the 1 page laboratory report for the above identified project. All analyses were subjected to rigorous quality control measures to assure data accuracy.

The following standard abbreviations and conventions apply throughout all Eastern Analytical, Inc. reports:

- < = "Less than" followed by the detection limit
- TNR = Testing Not Requested
- ND = None detected, no established detection limits

If you have any questions regarding the results contained within, please feel free to directly contact me, the department supervisor, or the analytical chemist who performed the testing in question.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

William Brunkhorst
Lab Director

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 5072 DUF

Client: Dufresne-Henry
Client Designation: **462063/Travel Center**

Sample Qty/Type: 6 aqueous
Date Received: December 2, 1992

Hazardous Substance List Volatile Organic Compounds

Sample ID:	MW-1	MW-3	MW-5	MW-6	MW-7	MW-8	
Matrix:	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	
Date of Analysis:	12/4/92	12/4/92	12/4/92	12/4/92	12/4/92	12/4/92	
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	EPA
Analyst:	WB	WB	WB	WB	WB	WB	Method
Dilution Factor:	10	1	1	1	1	1	
Chloromethane	< 50	TNR	TNR	TNR	TNR	TNR	601
Bromomethane	< 50	TNR	TNR	TNR	TNR	TNR	601
Vinyl Chloride	< 50	TNR	TNR	TNR	TNR	TNR	601
Chloroethane	< 50	TNR	TNR	TNR	TNR	TNR	601
Methylene Chloride	< 20	TNR	TNR	TNR	TNR	TNR	601
Carbon Disulfide	< 20	TNR	TNR	TNR	TNR	TNR	602
1,1-Dichloroethene	< 20	TNR	TNR	TNR	TNR	TNR	601
1,1-Dichloroethane	< 20	TNR	TNR	TNR	TNR	TNR	601
Trans-1,2-Dichloroethene	< 20	TNR	TNR	TNR	TNR	TNR	601
Cis-1,2-Dichloroethene	< 20	TNR	TNR	TNR	TNR	TNR	601
Chloroform	< 20	TNR	TNR	TNR	TNR	TNR	601
1,2-Dichloroethane	< 20	TNR	TNR	TNR	TNR	TNR	601
1,1,1-Trichloroethane	< 20	TNR	TNR	TNR	TNR	TNR	601
Carbon Tetrachloride	< 20	TNR	TNR	TNR	TNR	TNR	601
Bromodichloromethane	< 20	TNR	TNR	TNR	TNR	TNR	601
1,2-Dichloropropane	< 20	TNR	TNR	TNR	TNR	TNR	601
Trans-1,3-Dichloropropene	< 20	TNR	TNR	TNR	TNR	TNR	601
Trichloroethene	< 20	TNR	TNR	TNR	TNR	TNR	601
Dibromochloromethane	< 20	TNR	TNR	TNR	TNR	TNR	601
1,1,2-Trichloroethane	< 20	TNR	TNR	TNR	TNR	TNR	601
Cis-1,3-Dichloropropene	< 20	TNR	TNR	TNR	TNR	TNR	601
2-Chloroethylvinylether	< 20	TNR	TNR	TNR	TNR	TNR	601
Bromoform	< 20	TNR	TNR	TNR	TNR	TNR	601
Tetrachloroethene	< 20	TNR	TNR	TNR	TNR	TNR	601
1,1,2,2-Tetrachloroethane	< 20	TNR	TNR	TNR	TNR	TNR	601
Acetone	< 500	TNR	TNR	TNR	TNR	TNR	8015
2-Butanone (MEK)	< 100	TNR	TNR	TNR	TNR	TNR	8015
Vinyl Acetate	< 100	TNR	TNR	TNR	TNR	TNR	8015
4-Methyl-2-Pentanone (MIBK)	< 100	TNR	TNR	TNR	TNR	TNR	8015
2-Hexanone	< 100	TNR	TNR	TNR	TNR	TNR	8015
Benzene	**610**	**20**	< 1	**130**	**190**	< 1	602
Toluene	**130**	**1**	< 1	**3**	**13**	< 1	602
Ethylbenzene	< 10	< 1	< 1	< 1	**19**	< 1	602
Total Xylenes	**260**	**2**	< 1	**15**	**28**	< 1	602
Chlorobenzene	< 10	< 1	< 1	< 1	< 1	< 1	602
Styrene	< 10	< 1	< 1	< 1	< 1	< 1	602
Volatile Petroleum Hydrocarbons (C4-C7)	**1,000**	**100**	< 20	**200**	**500**	< 20	8015
(C8-C10)	< 200	< 20	< 20	< 20	< 20	< 20	8015
(C11-C16)	**200**	< 20	< 20	< 20	**200**	< 20	8015

Approved By: Timothy Schaper, Organics Supervisor Timothy C. Schaper

Eastern Analytical, Inc. 130 Hall St., Concord, NH 03301 (603) 228-0525

December 15, 1992

Peter Aldrich
Dufresne-Henry
Precision Park
North Springfield, VT 05150

Subject: Laboratory Report

Eastern Analytical, Inc. ID #: 5073 DUF
Client Identification: 462063/Travel Center
Sample Quantity/Type: 2 aqueous
Date Received: December 2, 1992

Dear Mr. Aldrich:

Enclosed, please find the 1 page laboratory report for the above identified project. All analyses were subjected to rigorous quality control measures to assure data accuracy.

The following standard abbreviations and conventions apply throughout all Eastern Analytical, Inc. reports:

- < = "Less than" followed by the detection limit
- TNR = Testing Not Requested
- ND = None detected, no established detection limits

If you have any questions regarding the results contained within, please feel free to directly contact me, the department supervisor, or the analytical chemist who performed the testing in question.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

William Brunkhorst
Lab Director

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 5073 DUF

Client: Dufresne-Henry
Client Designation: **462063/Travel Center**

Sample Qty/Type: 2 aqueous
Date Received: December 2, 1992

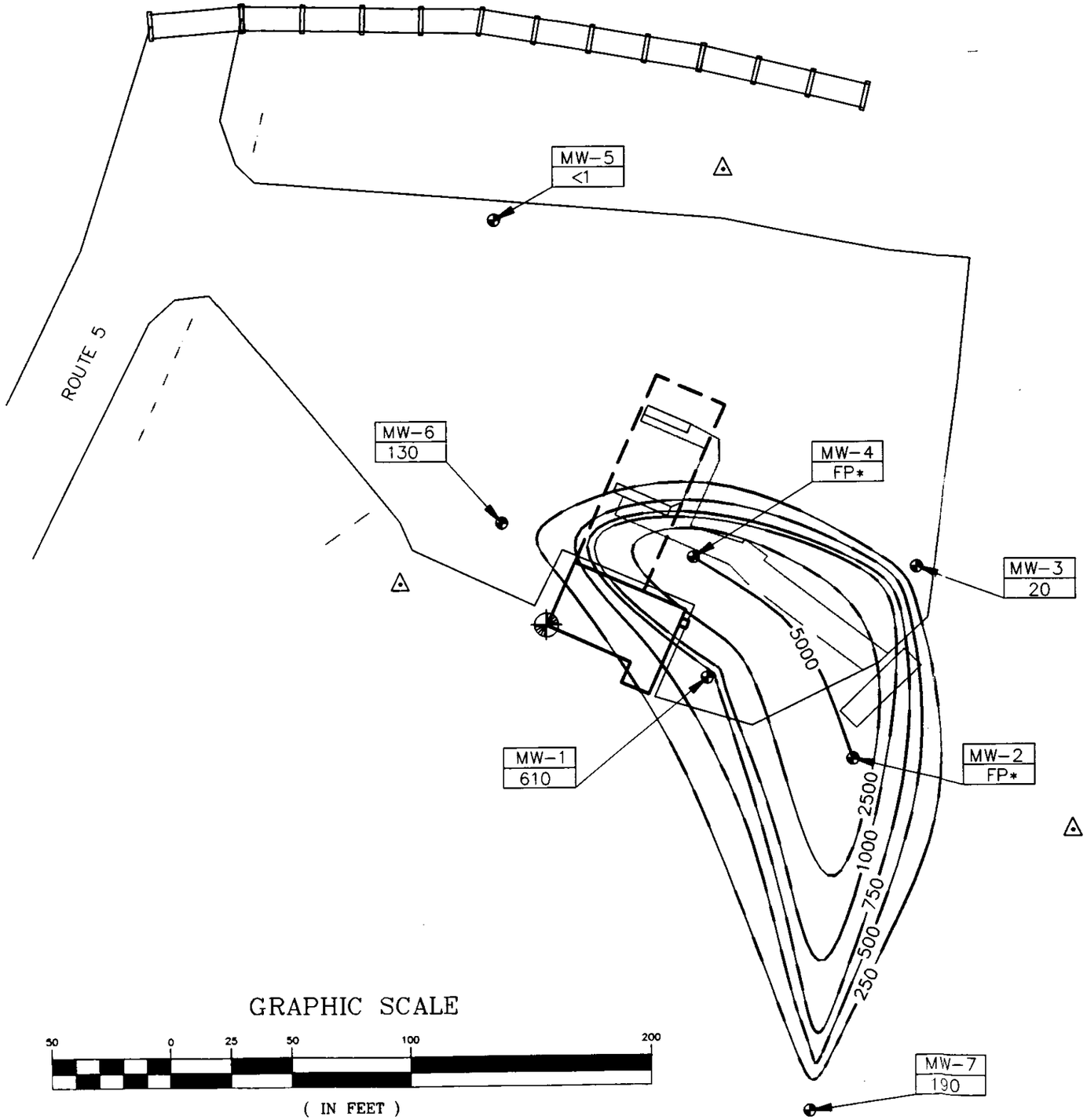
Petroleum Hydrocarbons

Sample ID:		MW-7	MW-8
Matrix:		Aqueous	Aqueous
Date of Extraction:		12/8/92	12/8/92
Date of Analysis:		12/10/92	12/10/92
Units:		mg/L	mg/L
Analyst:		BDS	BDS
Method:		EPA 8100	EPA 8100
Identification	**Carbon Range**		
None Identified	N/A	< 1	< 1

Approved By: Timothy Schaper, Organics Supervisor Timothy D. Schaper

APPENDIX K

BENZENE AND BTEX ISOCONCENTRATION MAPS



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

LEGEND

- BUILDING
- CANOPY AREA
- EDGE OF PAVEMENT
- ABANDONED RAILROAD TRACKS
- TEMPORARY BENCH MARK AT CORNER OF BUILDING, TOP OF CONCRETE, ASSUMED EL. 100.0
- TRAVERSE POINT
- MONITORING WELL
- MW-7 / 190 — MONITORING WELL NUMBER / BENZENE CONCENTRATION
- MW-4 / FP* — MONITORING WELL NUMBER / FREE PRODUCT (BENZENE CONCENTRATION OF 5000+)

NOTE:
MW-8 BENZENE CONCENTRATION WAS BELOW DETECTION LEVEL

Dufresne-Henry Inc.
Precision Park
No. Springfield,
Vermont 05150

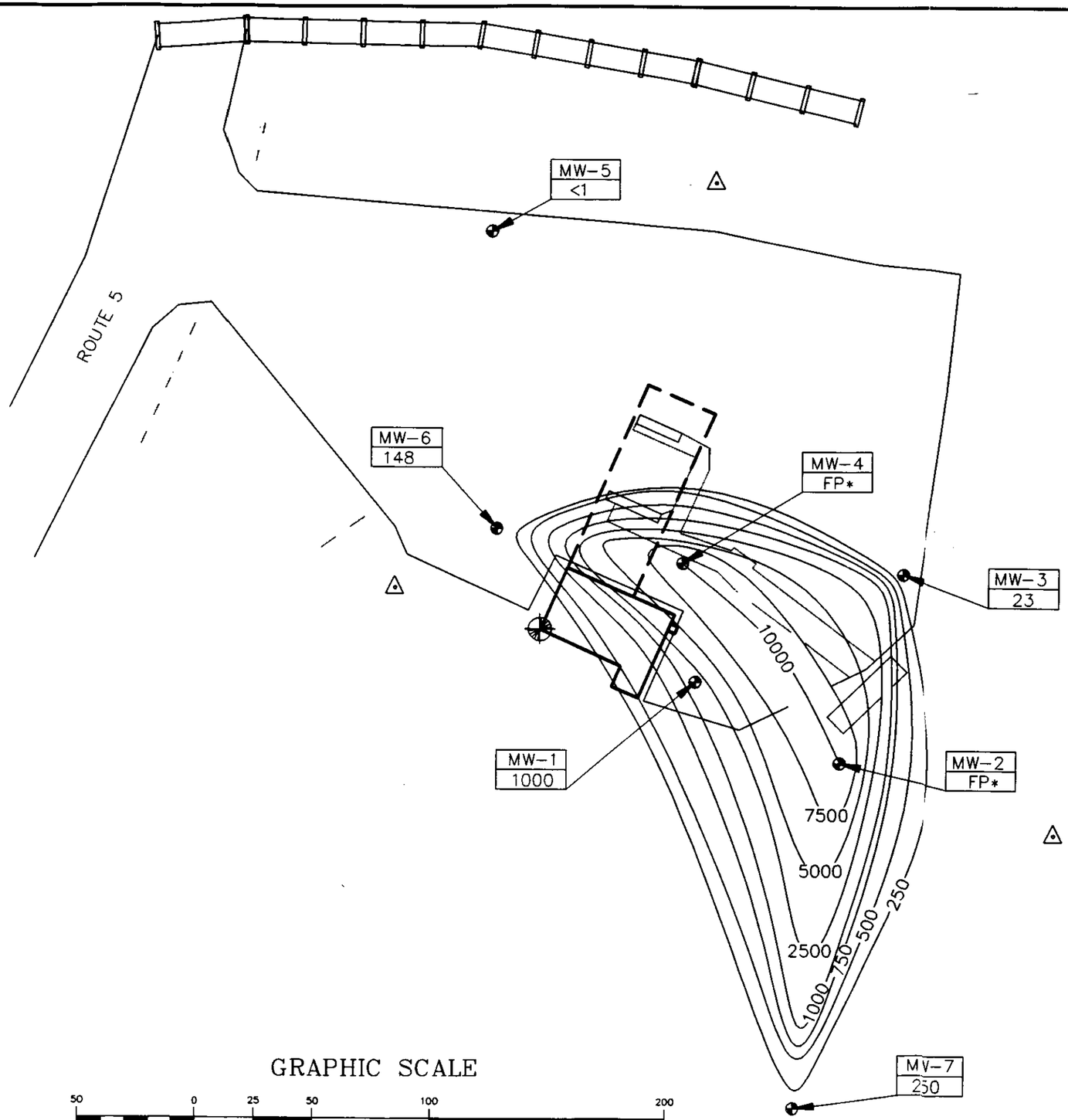
JOHNSON & DIX FUEL CORP.
SPRINGFIELD TRAVEL CENTER

BENZENE CONCENTRATIONS

AS OF DECEMBER 1, 1992

SPRINGFIELD, VERMONT

Client No. 462063 | Proj.Mgr. F.D.D. | Date 12/92 | B



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

N

LEGEND

- BUILDING
- CANOPY AREA
- EDGE OF PAVEMENT
- ABANDONED RAILROAD TRACKS
- TEMPORARY BENCH MARK AT CORNER OF BUILDING, TOP OF CONCRETE, ASSUMED EL. 100.0
- TRAVERSE POINT
- MONITORING WELL
- MW-7 / 250 — MONITORING WELL NUMBER, BTEX CONCENTRATION
- MW-4 / FP* — MONITORING WELL NUMBER, FREE PRODUCT (BTEX CONCENTRATION OF 10000+)

NOTE:
MW-8 BTEX CONCENTRATION WAS BELOW DETECTION LEVEL

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BTEX CONCENTRATIONS

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